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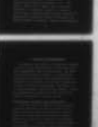
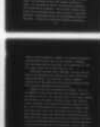
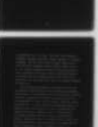
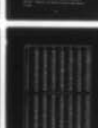
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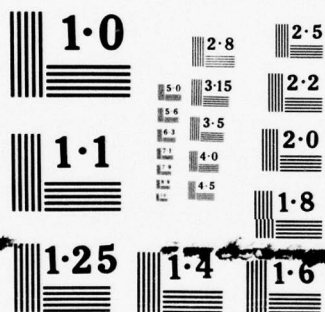
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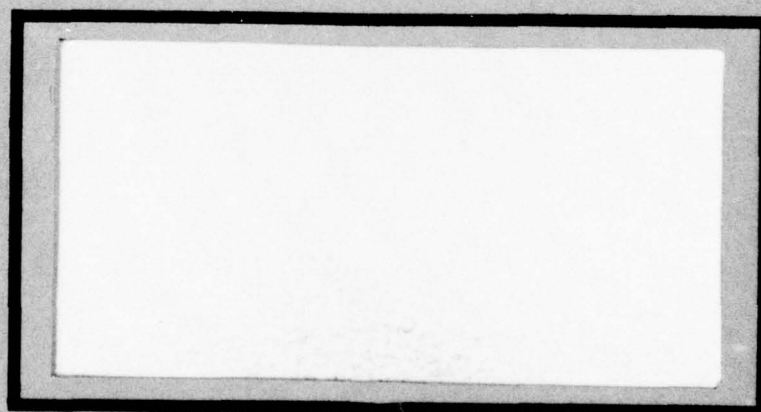


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THE RELATIONSHIPS AMONG
JOB SATISFACTION, JOB CHALLENGE,
JOB AUTONOMY, AND ROTTER'S
INTERNAL-EXTERNAL CONTROL MEASURE

THESIS

AFIT/GSM/SM/77S-1 Lawrence D. Cardinal
Captain USAF

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JOB SATISFACTION, JOB CHALLENGE
JOB AUTONOMY, AND ROTTER'S
INTERNAL-EXTERNAL CONTROL MEASURE.

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Presented to the Faculty of the School of Engineering
of the Air Force Institute of Technology
Air University

in Partial Fulfillment of the
Requirements for the Degree of

Master of Science

by

10 Lawrence D./Cardinal, B.S.
Captain USAF

Graduate Systems Management

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Preface

This research was performed for two reasons. First, it was done in partial fulfillment of the requirements for a Master of Science degree in Systems Management from the Air Force Institute of Technology (AFIT). Secondly, it was done to satisfy an interest on the part of myself and my advisor concerning the potential relationship between internal--external control and job satisfaction.

Although the research was performed with great care and, in my opinion, great depth, errors have been made. The most serious error was the omission of one question from the thesis survey. For this and any other errors, either in logic, form, or methodology, I accept full responsibility.

This research could not have been performed without the assistance of many individuals. First, I wish to thank Col. Louis P. Cyr and Ms. Mary Porter for their assistance in the surveying conducted at Keesler AFB, Miss. Next, I express my appreciation to the students, instructors, and staff personnel at Keesler and the students at AFIT for their cooperation in completing the thesis questionnaire. Also, a special thanks to Captain Larry J. Corbin for his assistance in the factor analysis of the AFFDL data and to Dr. Charles McNichols for his assistance with the computer analysis.

Next, I wish to express my appreciation to Dr. Michael Stahl, my advisor, whose assistance and encouragement proved invaluable during this research, and to Dr. T. Roger Manley, who served as reader for this effort.

Finally, and most importantly, I wish to dedicate this thesis to my parents, Anne and Arthur Cardinal, for their unending support throughout this thesis effort.

Lawrence D. Cardinal

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Abstract

The primary purpose of this thesis was to examine the relationships among ^(several job) the variables of job satisfaction, job challenge, autonomy, and the Rotter Internal-External (I-E) Control measure ^(AD 637 750). A secondary purpose was to determine if differences in internal-external ^(I-E) orientation exist between different ^(Air Force) sub-groups within the Air Force.

A survey was distributed to 229 students, instructors, and staff personnel at Keesler AFB, Mississippi; 100 students at AFIT who had been enrolled for at least three months; and 44 students about to enter the GSM and GOR programs at AFIT. A total of 338 usable responses were obtained.

Because one of the questions from the Rotter instrument was inadvertently omitted from the Keesler survey, a factor analysis study was performed to determine if the Keesler data was suitable for further analysis. Responses to the Rotter measure from the Air Force Flight Dynamics Lab (AFFDL) were factor analyzed with and without the question omitted from the Keesler survey. Based on this and a correlation analysis of the data with and without the missing question, it was determined that the data could be used for further analysis. When the data for the combined Keesler and AFIT samples was factor analyzed, six orthogonal factors were identified. Four of these factors were identified as: 1) personal control; 2) political control; 3) interpersonal control; and 4) general control.

The analysis of the survey data supported the hypothesis

(cont'd p vii)

that there is a positive relationship among the variables of job satisfaction, challenge, autonomy, and the Rotter I-E Scale. It was also found that ^{were found to be} ~~internals are~~ generally more job satisfied than externals. Finally, it was determined that the combination of high challenge, high autonomy, and internal control orientation provided for the highest level of job satisfaction found in this thesis. ^{survey.}

The ^{I-E} analysis dealing with internal-external orientation between various groups revealed that males are more internal than females, whites are more internal than non-whites, and enlisted personnel are more internal than officers. Because of the multidimensional nature of the Rotter measure, however, further validity and dimensionality studies into the I-E Scale are required before ^{any} recommendations can be made based upon the results of the analysis.

men, whites and enlisted personnel are more internal than, respectively, women, non-whites and officers.

THE RELATIONSHIPS AMONG
JOB SATISFACTION, JOB CHALLENGE,
JOB AUTONOMY, AND ROTTER'S
INTERNAL-EXTERNAL CONTROL MEASURE

I. Introduction

The purpose of this chapter is to establish the framework for the remainder of this thesis study. Because of its importance to the overall problem statement and the hypotheses to be tested, a brief outline of the Rotter theory is presented first. Next, a statement of the problem studied and the hypotheses tested in this study is made. A discussion of the limitations which must be placed on the interpretation of the results and the conclusions of this study and of several assumptions which have been made is presented next. Finally, an outline of the presentation plan for the remainder of this report is presented.

Rotter's Internal-External Control Theory

In 1966, while working on a research program supported by the Air Force, Dr. Julian B. Rotter published a theory of behavior dealing with generalized expectancies for internal versus external control of reinforcement. When behavior is reinforced over a period of time, an individual will develop generalized expectancies that this behavior will bring about certain outcomes:

In Rotter's social learning theory, the potential for any behavior to occur in a given situation is a function of the person's expectancy that

a given behavior will secure the available reinforcement and the value of the available reinforcements for that person (Lefcourt, 1966: 207).

There is a similarity, then, between Rotter's social learning theory and Vroom's theory of motivation. According to Vroom, each person holds certain expectancies about what outcomes are likely to result from different types of behavior. Associated with each expectancy is a valence, a measure of the importance the individual places on that outcome. Motivational force, then, is the product of the expectancy times the valence (Porter, et al., 1975).

Rotter, however, carries the process one step further with his internal-external locus of control concept. "In the framework of Rotter's ... theory, internal-external control refers to the degree to which an individual perceives success or failure as being contingent upon personal initiative" (Andrisani and Nestel, 1976:156). As Herbert Lefcourt states:

Internal control refers to the perception of positive and/or negative events as being a consequence of one's own actions and thereby under personal control; external control refers to the perception of positive and/or negative events as being unrelated to one's own behavior in certain situations and, therefore, beyond personal control (Lefcourt, 1966:207).

Rotter, then, presents the image of an internal as an individual who perceives that he is responsible for the successes and failures in his life. The external, on the other hand, sees his success or failure as contingent on factors which are outside his sphere of influence, such as

fate, luck, etc. It is this personal acceptance or non-acceptance of responsibility for one's success or failure that forms the basis for this study.

Statement of the Problem

The primary purpose of this thesis effort is to determine if there is an association between job satisfaction, job challenge, autonomy, and internal-external control. Earlier studies examining the possible relationship between job satisfaction and internal-external control have only considered the pair-wise correlation between these two variables. These earlier studies are discussed in further detail in the next chapter. This study, however, attempts to construct a four-variable model because this author perceives autonomy and job challenge as possibly being the key to the relationship between the other two variables of job satisfaction and internal-external control.

The internal is pictured as taking responsibility for success or failure in his life, and, therefore, it would also be expected that he would take responsibility for his success or failure on the job. If, on the other hand, this individual is not given the autonomy or freedom of decision necessary to personally insure success in the working environment, it should follow that he would express a lower level of job satisfaction. Similarly, if the internal is given the autonomy he requires or desires but the work does not present sufficient challenge for him to effectively or fully utilize his talents, this author perceives that a

lesser degree of job satisfaction would be attained.

The external, on the other hand, does not make the association between his efforts and abilities and his successes and failures. This individual, when faced with a challenging job, should not see it as an opportunity to exercise his abilities and should not, therefore, derive the same level of satisfaction as the internal with similar challenge. In like manner, the need or desire for autonomy, the independence to decide how and when the work is to be done, should not be as meaningful or important to the external because, again, the association between his actions and the outcomes in his life are not as strong as with the internal.

The Rotter measure has also been used in numerous studies to determine if certain groups of individuals are more internally or externally oriented than other groups. This study also examines this question for various sub-populations within the Air Force, such as between men and women, officers and enlisted, field grade and company grade officers, etc.

Hypotheses

The following hypotheses are tested in this study:

1. There is a positive relationship among the variables of job satisfaction, job challenge, autonomy, and the Rotter Internal-External Control measure.
2. Officers are more internally oriented than enlisted personnel.

3. Field grade officers (Lieutenant Colonel and Major) are more internally oriented and job satisfied than junior officers.

4. There is a positive correlation between career intent and internal-external control for personnel with less than 5 years active federal military service.

5. Males are more internally oriented than females.

6. Minorities (blacks, Spanish American, Mexican American, American Indian, etc.) are more external than whites.

7. Married and single persons are more internal than divorced, separated or widowed personnel.

8. Personnel in lower grades with high active federal military service are more external and less job satisfied.

9. There is no difference between rated and non-rated officers regarding internal-external control.

Hypotheses five and six are based upon other studies performed in this area and which are discussed in greater detail in the next chapter. Hypothesis seven is based upon an interest of this writer of the effect of the problems or trauma generally associated with a divorce or separation or the loss of a spouse on the outlook of the individual. The effect of trauma on the internal-external orientation of individuals has also been previously investigated in conjunction with the Rotter measure. Hypotheses two, three, eight and nine deal with the various sub-populations specific to the military discussed in the previous section.

Utility

Because of the numerous Master's theses concerning job satisfaction which have been sponsored by the Systems Management Department in recent years, the proposed work by Dr. Frederick Herzberg for the Air Force Logistics Command (AFLC) Headquarters, and the recent work by the Air Force Management Improvement Group (AFMIG) and the Quality of Life surveys, it is felt that the area of job satisfaction is of great interest to the Air Force. If an association between job satisfaction, job challenge, autonomy, and internal-external control is determined, a new avenue of study would be available to the Air Force.

This new area could center around the observation of strong internals and externals occupying similar positions to determine if certain jobs are more satisfying and better suited to internally oriented workers while others are better for externals. In line with the earlier discussion, if it is found that internals react well to positions of high challenge and autonomy while externals do not attain a similar degree of expressed job satisfaction, a basis for assignment of personnel to these positions could be established for further investigation, provided, of course, that job satisfaction for the individual is a criterion for assignment of personnel. It may also be of interest to see if groups comprised of a specified number of internals and externals holding specific types of jobs work better together than groups with a different make-up.

A second potential benefit of this analysis lies in an opposite consideration to the assignment of personnel. In many instances within the Air Force, the manager is not afforded the opportunity of selecting specific individuals to occupy a given position. Job design, therefore, becomes an important tool for increasing job satisfaction. A knowledge of the relationship hypothesized in this study could assist the manager in structuring the positions in his organization toward this end.

Limitations

The primary limitation to be placed upon the interpretation of the results of this research concerns the ability to generalize these results to all populations. Although the sample population is comprised of several different groups which were surveyed at different times, each of the respondents is a member of the United States Air Force, and, therefore, the sample population may be described as consisting of military personnel. Specifically, three separate groups were surveyed: 1) students, instructors, and staff personnel from the 3300th Technical Training Wing, Keesler Air Force Base, Mississippi; 2) students attending AFIT who had been enrolled for a period of at least four months; and 3) new students who were about to enter the GOR and GSM programs. The individuals, then, share another common characteristic - in addition to being military personnel, they are also involved in some form of education, either as students, instructors, or staff personnel. The

ability to generalize the results of this study to personnel outside the military, however, may be limited.

A second limitation involved with this study concerns the comparison of the scores obtained for the Rotter measure with those obtained in other studies. When the survey was initially distributed to personnel at Keesler, one of the Rotter questions was inadvertently left out. The Rotter scores presented here, therefore, represent a total based on one less question than the usual Rotter score. A further discussion of the Rotter I-E Scale is presented in the third chapter of this report. An extensive factor analysis, which is discussed in detail in the fourth chapter of this report, indicates that the omission of this question does not affect the validity of the measure. However, due to the omission, comparisons with other Rotter studies must be qualitative, not quantitative in nature.

Assumptions

As mentioned above, the survey responses of three separate groups have been combined to form the data base for this thesis. In conjunction with the first limitation discussed in the previous section, the first assumption to be made is that the groups may be combined to form a homogeneous population. This assumption is based upon the belief that whatever differences may exist between the separate groups with respect to the items of concern in this study, these differences are minor in comparison to the similarity of the groups with regard to their military

background.

A second assumption, closely tied to the first, is that there is no difference in Rotter orientation between students who have been enrolled at AFIT, in an academic environment, for a period of time and those just entering the programs.

A third assumption is necessary due to the instructions given in conjunction with the administration of the survey. In order for an individual to answer questions concerning job satisfaction, it is necessary for that individual to perform in a given position for a sufficient period of time in order to obtain a basis for satisfaction or dissatisfaction. Accordingly, those personnel who had been assigned to their job for less than six months were instructed to answer the questions concerning their work with respect to their last job. The assumption, therefore, is that feelings of satisfaction or dissatisfaction do not change significantly concerning one's previous job over a period of six months (Scoville, 1976).

Finally, since no pre or post-tests of the Rotter or Hoppock measures have been made, the data provided by these measures is assumed to be valid. Extensive validity studies have been performed in the past and are presented in detail in the next chapter. The results of these studies make this assumption rather straightforward.

Analysis Plan

The following is an outline of the chapters presented in the remainder of this study.

Chapter 2: Background. This chapter presents a detailed literature review of similar work done in the areas of job satisfaction, job challenge, autonomy, and the Rotter Internal-External Control theory.

Chapter 3: Methodology. This section describes the various tests utilized in the analysis of the data for this study. A discussion of the questionnaire, sample population, and the Rotter and Hoppock measures is also made.

Chapter 4: Factor Analysis of the Rotter Measure. As mentioned previously, the omission of the one Rotter question necessitated a rather detailed factor analysis study. The results of this study and a comparison with other similar studies are presented in this chapter.

Chapter 5: Results. As the name implies, this chapter discusses the results of the hypothesis testing for this thesis.

Chapter 6: Conclusions and Recommendations. This final chapter attempts to interpret the results of this study and to make recommendations for further analysis based upon the results.

II. Background

The purpose of this chapter is to provide a more detailed examination of the Rotter theory and to present the findings of several other studies of job satisfaction which deal with criteria similar to this effort. Additionally, several other studies involving the Rotter measure are discussed as well as other items of interest which provide a more comprehensive framework for the analysis performed by this writer. Because the subject of factor analysis is being considered as a separate topic in Chapter 4, a discussion of several dimensionality studies of the Rotter measure is delayed until that time.

Theoretical Development

As outlined in the previous chapter, Rotter's internal--external control theory finds its basis in his earlier work in the development of social learning theory. Essentially, when an individual's behavior is reinforced over a period of time, the individual develops an expectancy that the given behavior will produce or secure the resultant reinforcement. At the same time, if the reinforcement does not follow the behavior, the individual's expectancy for the reinforcement will be lessened.

The degree to which an individual's expectancy is strengthened or diminished is also dependent upon the degree to which the individual perceives that the given expectancy is contingent upon his own behavior. In general, if a

person sees that reinforcement is contingent upon his own behavior, the degree to which the expectancy is increased will be greater than when he views the reinforcement as independent of his actions. Likewise, the amount that the expectancy is decreased is less following non-reinforcement if the association between one's own behavior and the resultant reinforcement is not as strong. "It seems likely that, depending upon the individual's history of reinforcement, individuals would differ in the degree to which they attribute reinforcements to their own actions" (Rotter, 1966: 261).

Rotter further theorizes that when an individual perceives a group of actions or behaviors and their outcomes or reinforcements to be related or similar, specific expectancies become generalized for that class of related events. It should follow, then, that when many reinforcements are seen as contingent upon one's behavior for a number of varied outcomes, an individual would form a generalized expectancy concerning the outcomes and his behavior. It is this generalized expectancy which Rotter labels as internal control. The opposite expectancy, external control, results from a general class of reinforcements which follow an individual's actions but which are not perceived as contingent upon these actions. They appear to be more dependent upon the unseen forces of luck or fate or under the control of other persons (Rotter, 1966). This, then, is the underlying theory of generalized expectancies for internal versus

external control of reinforcements.

A major portion of the experimental work performed by Rotter in the development of his theory centered around the observation of persons in chance versus skill controlled experiments. Specifically, Rotter would separate his subjects into two groups, one being instructed that their success was dependent on skill, whereas the other group was told that success or failure was based on chance. In actual fact, the testing was controlled by the experimenter and was identical for both groups. A subject's expectancy was indicated in several ways: verbally, the betting of chips, etc. The amount of reinforcement provided to the subjects varied from 0% to 100%.

In each of the experiments, those persons in the skill instructed groups persisted longer in non-reinforced, extinction trials and tended to explain non-reinforcement as an indication of a lack of skill on their part. The chance groups, however, indicated that the task was beyond their control and were not as persistent. A second finding was that individuals in the skill groups experienced larger increases and decreases in expectancy following reinforcement and non-reinforcement than did the chance groups (Lefcourt, 1966). These results confirm Rotter's theory that the degree to which an expectancy is strengthened or diminished depends on the individual's perception of control.

Application of the Rotter Measure

As indicated in the first chapter, the Rotter measure

has been utilized in several studies to determine if particular groups express a significantly more internal or external orientation than other groups. A.P. MacDonald (1974) references an extensive list of such studies ranging from the relation of internal-external control and achievement behavior and influence attempts to its relation with the use of automobile seat belts and the practice of birth control. A number of these studies, however, are relevant to both the Air Force and this study.

One major area of investigation has been with differences in internal-external control between ethnic groups and social classes. The philosophy behind these studies is that blacks, Spanish Americans, American Indians, etc. and the poor have faced both de jure and de facto barriers to their advancement for so long that a feeling of helplessness against the system is far more likely for these groups than for middle and upper-class whites. The hypothesis, then, is that minorities and the poor are more external than middle and upper-class whites.

Rotter, himself, investigated this area. In that study, however, Rotter used 80 sixth and eighth-grade students from Columbus and Dayton, Ohio. Rather than using the measure discussed previously, the children were given a projective type test, developed by Rotter's co-experimenter, Esther Battle, in which the children were shown six pictures and asked to respond to the situations depicted in each. This experiment showed significant differences between lower-class

blacks and middle-class blacks or upper and lower-class whites, the lower-class blacks being most external. The middle-class white students reflected the most internal orientation (Battle and Rotter, 1963).

Lefcourt and Ladwig tested black and white prison inmates utilizing Rotter's measure, Rotter's Level of Aspiration Board task, and Dean's Test of Powerlessness and Normlessness. Powerlessness refers to a perception by the individual that he is incapable of succeeding or achieving within a given situation or system. Normlessness refers to the perception that behavior which represents a deviation from the norm is necessary to achieve in a situation. It should also be noted that the white inmates came from lower socioeconomic backgrounds. The tests were administered to 60 black and 60 white inmates from similar social class and of similar intelligence. The mean score for the black inmates on the Rotter measure was 8.97 with a standard deviation of 2.97. For the white inmates, the figures were 7.87 and 3.03 respectively. This results in a t value of 2.00 and a two-tailed significant difference of 0.05. The powerlessness and normlessness scores also indicated a significant difference at the 0.01 and 0.001 levels respectively. These results further confirm the external orientation of blacks compared to whites (Lefcourt and Ladwig, 1965).

The ethnic studies have not been limited to blacks versus whites. Graves and Jessor studied high school students in a tri-ethnic community. "They found whites to be least external,

followed by Spanish Americans. Indians were the most external in attitudes" (Lefcourt, 1966:212).

Rotter also examined the difference in locus of control between men and women. Rotter indicates that sex differences do not appear to be significant with the exception of a sample of students from the University of Connecticut (N = 303). He reports that the difference was significant with the women expressing the more external orientation, however, he fails to report the means for the groups or the associated t-value (Rotter, 1966). Feather also found that females are more external than males in a study conducted at the University of England (Feather, 1967).

Applications with Job Satisfaction

In addition to the studies discussed above, the Rotter measure has been used in several other studies to determine the relationship between job satisfaction and internal--external control. As mentioned in the first chapter, however, these studies examined the two-way interaction of job satisfaction and locus of control while this effort includes the additional variables of challenge and autonomy.

In one of the experiments, perceptions of leadership behavior, job satisfaction, and internal-external control were examined within the nursing field. Specifically, three levels of nursing were utilized: attendants, psychiatric aides, and registered nurses. Sample sizes for the respective groups were 39, 40, and 20. The Job Descriptive Index (JDI) was used to measure job satisfaction. The JDI yields

satisfaction scores in five separate areas (Work Itself, Pay, Supervision, Co-Workers, and Promotional Opportunities) as well as a total satisfaction score. The full 29 question Rotter measure was also employed. Although no significant correlations between job satisfaction and internal-external control were found in the attendants or the registered nurses, " ... significant relationships were found in the Psychiatric Aide group" (Preyer and Distefano, 1971:536).

In a second study, Andrisani and Nestel (1976) surveyed 2972 middle-aged males to determine internal-external control and its relationship with several aspects of the work experience. Among the dimensions selected for examination were: hourly earnings, job satisfaction, annual earnings, and perceived financial progress. The sampling was actually done in two phases, $n = 1483$ in 1969 and $n = 1489$ in 1971, because one of the objectives of the study was to determine the relationships between internal-external control and changes in variables over time. The results of this work showed that mean differences between internals and externals were significant at the 0.01 level for variables such as occupational attainment, hourly earnings, job satisfaction, annual earnings, and perceived financial progress. Mean differences between internals and externals were also found for change in job satisfaction at the 0.05 level, while change in annual earnings was significant at 0.01. These results indicate that internals hold positions of higher status, earn more money, and tend to be more job satisfied

than externals.

In a final study, utilizing governmental employees, Lichtman (1970) surveyed 15 upper-level managers, 26 first-line supervisors, and 54 workers to determine if job satisfaction is related to internal-external control and several other variables, such as tension, productivity, etc. The first significant result, concerning locus of control, was that the upper-level managers were significantly more internal than the first-line supervisors who were in turn more internal than the workers. The same findings held for job satisfaction differences between the three groups. Another factor which also appeared significant was tension but with the order reversed, workers reflecting greatest tension while the managers expressed the least. In all of the articles examined by this writer, this study found the highest correlation between job satisfaction and internal--external control ($0.40, p < 0.01$) which is interpreted as indicating that internals are more job satisfied than externals. Another significant correlation involved tension and internal-external control, the correlation being negative ($-0.31, p < 0.01$) which indicates that individuals who feel tension on the job tend to be more external. Productivity, however, was not found to be significantly correlated with locus of control. The correlations between tension, job satisfaction, and internal-external control were interpreted by the author as indicating the following:

The lower internal control scores for the workers

suggests that their low levels of job satisfaction are also linked to greater feelings of anxiety over their perceived lack of power to influence their outcomes within the organization (Lichtman, 1970:79).

Other Supporting Research

Although the above studies were the only ones found by this writer to deal specifically with the subject of job satisfaction and internal-external control, other work with the Rotter scale and other studies along similar lines tend to support the proposed relationship.

One of the four main variables under consideration in this study is job autonomy or the freedom to decide how and when the work is to be done. Cromwell, et al. (1961) performed an experiment in which schizophrenics were compared to normal subjects. On three separate measures of locus of control, the schizophrenics expressed a significantly more external orientation than did the normal subjects. In a test which dealt with reaction times, the researchers "... found that normals did better in and preferred situations allowing autonomy, while schizophrenics did better in and preferred externally controlled situations" (Lefcourt, 1966: 212). Since the normal (internal) subjects performed better in and preferred the autonomy situations more than the schizophrenics (externals), it should follow that internals would be more job satisfied than externals when the work provides such autonomy.

Another area in which internals and externals have been compared surrounds the attempt by the individual to control

his environment. After reviewing a number of studies in this area, Joe (1971) concludes that internals are more prone to attempt to control their environment and their own impulses than are externals. He also concludes, "... that internals, in contrast to externals, would show a greater tendency to seek information and adopt behavior patterns which facilitate personal control over their environments" (Joe, 1971:627). This further tends to support the hypothesis that internals react or cope better in positions of challenge and autonomy because of their tendency to utilize the autonomy to adapt to or meet the challenge.

Lawler and Hall (1970) also dealt with the subject of the relationship of autonomy and challenge to job satisfaction. Their study did not utilize the Rotter measure, however, they were concerned with a variable called intrinsic motivation. Although intrinsic motivation and internal locus of control are not necessarily the same, the former has been associated with job involvement. Joe (1971) has also concluded that internals express a greater interest and involvement in achievement-related activities than do externals. Lawler and Hall have concluded from their research that

The more the job holder feels he has control over what goes on, the more he feels his job allows him to be creative; and the more he feels the job is appropriate to his abilities, the more satisfied he is in the autonomy and self-actualization need areas (Lawler and Hall, 1970:309).

A logical extension of the feeling of control or autonomy that the individual perceives is his further perception that

this autonomy can be used to achieve results (internal orientation). The former perception deals with the formal freedom on the job while the latter refers to locus of control.

As mentioned in the first chapter, the Systems Management Department has sponsored many theses in recent years which have examined job satisfaction in the Air Force. One particularly interesting study was performed by Captain Thomas N. Thompson in 1975. In this study, Thompson analyzed job satisfaction in the Air Force based upon the responses of 10,998 officers and enlisted men to the first Quality of Life survey conducted by the AFMIG people in 1975. He used the Automatic Interaction Detection (AID) algorithm and regression analysis to identify which aspects of the Air Force job are the primary determinents of job satisfaction. Thompson concluded that three job-related perceptions were the principle factors affecting job satisfaction in the Air Force. These were identified as:

- 1) the perception of job challenge;
- 2) the perception of being prepared for future positions of greater responsibility; and
- 3) the perception of job freedom [autonomy] (Thompson, 1975:101).

Summary

The Rotter internal-external control measure has been a popular device in the past several years, and the results indicate that internals differ from externals in a wide

variety of areas. The literature presents the picture of the internal as taking more personal responsibility for his success or failure, more adaptive to his environment, coping better in positions of autonomy and challenge, and more job satisfied than the external. Although some work has been done concerning the relationship of internal-external control with job satisfaction, the variables of challenge and autonomy have not, thusfar, been specifically considered. The research also indicates that those who have faced legal or perceived barriers to their advancement over a long period of time tend to be more external. These conclusions support the hypotheses presented in the first chapter and provide the necessary background for the analysis presented in the remainder of this report.

The next chapter discusses the instrument used for data collection, the sample population, and the analysis techniques employed to test the proposed hypotheses.

III. Methodology

The purpose of this chapter is to present a detailed discussion of the methods used in this thesis effort to collect the required data and of the techniques used for the analysis of this data. First, the basic analysis plan is laid out. Second, a discussion of the survey utilized for data collection is presented. This discussion includes a background on each of the separate measures contained in the questionnaire. Next, each of the groups that comprise the sample population is described. Finally, a discussion of the various analytical techniques used to test the hypotheses listed in Chapter 1 and to examine the dimensionality of the Rotter measure is presented.

Analysis Plan

The primary focus of this study is the determination of the relationships among the four variables of job satisfaction, job challenge, job autonomy, and Rotter's Internal-External Control measure. The first three variables have been examined in numerous studies of Air Force personnel in the past, however, no sampling has been done concerning these three and the Rotter measure. It was necessary, therefore, to construct a new questionnaire and to conduct a new survey. Because the widest variety of grade and experience backgrounds was desired without the necessity of sampling an extremely large number of personnel, it was decided to conduct the survey at Keesler Air Force Base, Mississippi since a large

portion of the advanced technical training for various fields in the Air Force is conducted at Keesler. After this surveying was completed, it was decided that more responses from officer personnel were required and some of the students at AFIT were asked to complete the questionnaire. A detailed discussion of each of these groups follows later in this chapter.

As mentioned in the first chapter, one of the Rotter measure questions was inadvertently left out of the survey distributed at Keesler AFB, and a detailed factor analysis study was performed to determine the effect of the omission and whether the data was usable for further analysis. The results of this analysis raised some serious questions as to the validity of the Rotter measure. Consequently, the reliability or internal consistency of the measure was tested.

The first step in the analysis of the survey data was the examination of the correlations of each of the four main variables with each other and of several demographic items with each of the four variables. An alpha level of approximately 0.05 was considered to indicate significance.

Next, means testing was employed to determine if certain groups expressed a significantly higher level of job satisfaction than other groups. In order to divide the population into dichotomous groups based upon some of the variables, splitting was done based upon the mean for the given variable. For example, high versus low challenge was

based upon the mean level of challenge expressed by the population. For the Rotter measure, those falling below the mean are considered to be internally oriented while those with scores higher than the mean are externally oriented.

Finally, regression analysis was performed in an attempt to formulate an overall model of job satisfaction based upon the variables of challenge, autonomy, and internal-external locus of control. Some of the demographic variables were also included for consideration in this analysis.

The Questionnaire

The questions which comprise the survey used in this study have been taken from four separate sources and may be divided into three separate categories: 1) demographic data; 2) questions concerning various aspects of the respondent's attitude toward his job and his career; and 3) the Rotter Internal-External Control measure. The complete questionnaire may be found in Appendix A.

Each of the demographic data questions, the career intent question, and the job challenge question were taken from the first Quality of Life survey which, as mentioned before, was developed for use by AFMIG and distributed to a random selection of personnel, stratified by grade, throughout the Air Force. A higher number of personnel in senior ranks, both officers and enlisted, were sampled, however, to insure that the number of responses from those grades would be large enough for statistical analysis (Thompson, 1975). Although no specific reliability analysis for this survey

has been found by this author, the simple Likert scale career intent and job challenge questions are assumed to be both valid and reliable indicators of these variables.

The job autonomy question (Appendix A, Question 13) was taken from the Job Diagnostic Survey developed by Hackman and Oldham (1975). This instrument was designed to measure five dimensions of the respondent's work experience: skill variety, task identity, task significance, autonomy, and feedback from the job itself.

Job satisfaction levels were measured with the Hoppock four-question (Appendix A, Questions 8-11) general job satisfaction measure (Hoppock, 1935). Scores for each of the individual questions range from 1 to 7 for responses A to G respectively on questions 9 and 10. The order is reversed for questions 8 and 11, and, therefore, the scores range from 7 to 1 for A to G respectively. The total job satisfaction score is obtained by summing the scores for each individual question and, therefore, ranges from 4 to 28. The higher the score, the higher the level of job satisfaction expressed.

The Hoppock measure has been utilized in numerous studies including the Quality of Air Force Life survey discussed previously. Extensive reliability and validity testing was performed based upon the responses to the AFMIG survey and other samples. "Results indicate that the Hoppock questions provide a meaningful global measure of job satisfaction which can be effectively used in organizational and Quality

of Life research" (McNichols, Stahl, and Manley, 1976:1).

The measurement of job satisfaction also brought about an interesting problem. In order to develop a stable perception or feeling of job satisfaction/dissatisfaction, an individual must hold that job for a period of time. It was necessary, therefore, to establish a guideline for experience in a job for an individual to answer the Hoppock measure with respect to that job. It was decided, therefore, that if a respondent had held his job for six months or more, his job satisfaction responses were with respect to that job. If he had worked in a position for less than six months, he answered with respect to his previous job. Those personnel with less than six months active duty service time were not utilized in this study. Additionally, TDY students at Keesler answered regarding their permanent duty station job (still subject to the six month rule), and all AFIT students answered with respect to their previous job.

The Rotter Internal-External Control measure or I-E Scale (Rotter, 1966) comprises the last portion of the questionnaire. This scale consists of 29 forced-choice questions, six of which are filler. The remaining 23 questions consist of an internally oriented statement and an externally oriented statement. External choices are scored as a 1, while the internal responses are scored as a 0. The score for the measure is the sum of the external choices, and, therefore, ranges from 0 to 23. The lower the score, the more internal the orientation.

In Rotter's study (1966), he discusses the validity and reliability of the I-E Scale. Rotter points out that the internal consistency estimates are relatively stable, ranging from 0.65 to 0.76 for a wide variety of sample populations. One month test-retest reliability figures are also consistent for two groups, Ohio State University students and prisoners at the Colorado Reformatory, with scores of 0.60 and 0.78 respectively. He also tested the scale for social desirability using the Marlowe-Crowne Social Desirability Scale and found a median correlation of -0.22 for different samples of male and female college students. Finally, he reports that two factor analysis studies were performed, his own and another by Franklin (1963), both indicating one general factor which accounted for over 50% of the variance. Based upon these various tests, Rotter concluded that the I-E Scale is valid, reliable, and not subject to social desirability. Cone (1971), however, found a somewhat higher level of social desirability when employing the Edwards Social Desirability Scale. Some of the other literature, which is covered in the next chapter, also questions the unidimensionality of the Rotter measure and raises some doubts as to the validity of the measure.

For those respondents at Keesler AFB, the Rotter survey consisted of only 28 questions with the following omitted:

- a. I have often found that what is going to happen will happen.
- b. Trusting to fate has never turned out as well for me as deciding on a definite course of action.

Because this is not one of the filler questions, the maximum score possible for this group is 22. It should be noted that whenever the responses for the different groups are combined, any reference to the Rotter measure includes only the 22 questions, unless otherwise noted.

The Sample Population

As mentioned previously, the sample population for this study is comprised of three separate groups of Air Force personnel. The first group includes students, faculty members, and staff personnel from the 3300th Technical Training Wing at Keesler. A total of 229 surveys were distributed to this group; 224 of these were found suitable for use. Because of the large number of fully completed questionnaires, it was decided that any question left blank, any Rotter question with both alternatives selected, or any Rotter question reworded would constitute an invalid response. As can be seen above, only 5 surveys were disregarded. Of the 224 respondents, 36 were officers, 188 were enlisted; 15 were female, 209 were male; the mean time in service was 11 years; 192 responded white while 32 answered other than white; the means for the Hoppock, Rotter, challenge, and autonomy scores were 19.4, 8.1, 3.5, and 4.4 respectively. A further breakdown by grade is provided in Appendix B.

The second group is comprised of students at AFIT who had been attending classes for at least three months at the time of the survey. The questionnaire distributed to this group was a slightly modified version of the Keesler form.

The Rotter question which had been omitted was included and all questions referring to the respondent's job were reworded to emphasize that his previous job was to be considered. A total of 100 questionnaires were sent out, 75 were returned, and, again, only 5 were rejected for the same reasons listed previously. Since AFIT students were surveyed, this group is comprised of all officers; the mean time in service is 8.4 years (50 of the 70 respondents were Captains); there were only two females; four classified themselves as non-white; and the means for Hoppock, Rotter, challenge, and autonomy were 19.7, 9.3, 3.7, and 4.9 respectively. A breakdown of this group by grade is also found in Appendix B.

Finally, a group of 44 AFIT students just entering the GSM and GOR programs was sampled during their initial meeting for SM 6.00, Managerial Accounting. It was the intent of this second sampling of AFIT students to determine if the environment of a student tends to affect his locus of control orientation due to a feeling of lack of control over his life in an academic situation. These students were given the same questionnaire distributed to the other AFIT students described above and all of the responses were found suitable for use. This group was again comprised of all officers; mean time in service was 7.2 years; there was one female; only one respondent was non-white; the Hoppock, Rotter, challenge and autonomy means were 19.9, 8.0, 3.7, and 4.7 respectively. The breakdown for this group is also found in

Appendix B.

Analytic Techniques

In this section each of the techniques used in the analysis of the survey data is discussed. Additionally, the robustness of the t test which is employed in this study for difference in means testing is examined.

Parametric versus Nonparametric Statistics. In considering the analysis of data, one question which often arises is the appropriateness of using parametric statistics due to the assumptions which underly these statistical techniques. The alternative, when these assumptions are not met, is the use of nonparametric or distribution-free statistics. The choice relevant to this study is the use of the parametric t test versus the nonparametric Mann-Whitney test for difference in means testing.

The assumptions underlying the t test (to be discussed in detail later) involve sampling from independent, normal distributions with equal variances. For the Mann-Whitney test, however, the only assumptions are that the samples are random and continuous and that the measurement scale be at least ordinal (Conover, 1971:224). Those variables for which the test is applied in this study meet the nonparametric criteria.

In most instances, the size of the groups under consideration is sufficiently large as to allow the central limit theorem to be invoked. The central limit theorem justifies

the approximation of the distribution of the sample mean with a normal distribution having a mean μ and a variance of σ^2/n when n is fairly large. The term fairly large may be rather deceptive since a sample size of approximately 30 is generally considered sufficiently large to invoke the central limit theorem (Freund, 1971).

In some instances, however, the size of the group in this study is much smaller than 30 and the question still arises whether to employ the t test or the Mann-Whitney test.

Boneau (1960), however, performed an extensive analysis of the robustness of the t test. In that study, he drew random samples from various distributions (normal, rectangular, or exponential) which had means of 0 and variances of 1 or 4. The sampling was done with various combinations of these distributions and variances with sample sizes of 5 and 15. He then computed a large number of t values based upon the samples, constructed a frequency distribution of these t values, and compared these with the theoretical t distribution curve for the appropriate degrees of freedom. Boneau then states:

Having violated a number of assumptions underlying the t test and finding that, by and large, such violations produce a minimal effect on the distribution of t 's, we must conclude that the t test is a remarkably robust test in the technical sense of the word (Boneau, 1960:62).

With Boneau having used sample sizes as low as 5, this writer sees no problem in employing the t test for analysis of the differences in means in this study.

Two Sample t Test. The t test, as found in the Statistical Package for the Social Sciences (SPSS) programs (Nie, et al., 1975), is used in this study to determine if the mean of one group for a given variable is significantly different from the mean of another group. SPSS is, in fact, used for all analysis of the data in this study. The SPSS program performs the t test calculations in two different forms, one assuming the variances for the two populations are equal, the other assuming they are unequal. Under the equal variance assumption, the sample means and variances are calculated for the two groups and a pooled variance for both groups is computed. The appropriate t value and its associated probability is then calculated. If this probability is less than the significance level chosen, the means for the groups are considered to be significantly different.

If, on the other hand, the population variances cannot be assumed equal, the t value cannot be computed as above. It can, however, be approximated using different calculations for both the t value and the degrees of freedom. The results of this comparison of means is not exact, however, the approximation is considered to be reasonably accurate.

The decision as to whether the population variances may be assumed to be equal is based upon the F test of the sample variances. If the F test is not significant, the variances are assumed equal and the pooled variance technique is employed. Otherwise, the separate variance approximation is used.

Pearson Product-Moment Correlation. For correlation analysis, again the question arises whether to use the parametric Pearson correlation coefficient or the nonparametric Spearman or Kendall measures. The Pearson measure is based upon the bivariate normal and examination of the histograms in Appendix C for the Hoppock, Rotter, challenge, and autonomy scores suggests distributions which are approximately normal. A comparison was, therefore, made using the Pearson and Spearman measures. The correlation between the full Rotter measure and the score based upon 22 questions was computed. The Pearson and Spearman coefficients were identical to three digits. The Pearson measure is, therefore, used for all correlations in this study.

The Pearson coefficient is a measure of the strength of the relationship between two variables (Hogg and Craig, 1970). The value of the coefficient ranges between -1 and 1. As the value approaches -1 or 1, the stronger is the indicated relationship, negative or positive respectively, between the variables. A value close to 0 indicates a weak relationship. Along with the Pearson coefficient and the number of cases used in the computation, the SPSS subroutine calculates an associated level of significance based upon the Student's *t* distribution (Nie, et al., 1975).

Regression Analysis. One of the proposed purposes of this study is the formulation of a model of job satisfaction based upon the variables of job challenge, autonomy, and the Rotter I-E Scale. "Multiple regression analysis is a general

statistical technique through which one can analyze the relationship between a dependent or criterion variable and a set of independent or predictor variables" (Nie, et al., 1975:321). In this study, job satisfaction is used as the criterion variable while job challenge, autonomy, and the Rotter measure are used as predictor variables. The objective of such an analysis is to formulate the linear model based upon the predictor variables which best describes or explains the criterion variable of job satisfaction. The term "best" here refers to the determination of the linear relationship such that the summed squares of the differences between the actual or observed value of the criterion variable and the predicted value (sum of squares error, SSE) is minimized (Draper and Smith, 1966).

Several approaches to regression analysis are available under SPSS, and the forward selection procedure was chosen for use in this study. This method involves an iterative process in which the predictor variable having the highest correlation with the criterion variable, and, therefore, accounting for the most variance, is selected first. Next, the remaining predictor variables are examined, and the one with the highest partial correlation with the criterion variable is selected. This process continues until either all of the predictor variables have entered the regression or until the remaining variables fail to meet certain criteria (Draper and Smith, 1966).

Under SPSS, the user may specify what statistical

criteria are used for selection. Specifically, he may establish: 1) the maximum number of variables to enter; 2) a minimum F value, which is the F ratio computed for significance testing of the regression coefficient; and 3) a tolerance, which is "... the portion of the variance of that variable not explained by the independent variables already in the regression equation" (Nie, et al., 1975:346). For this study the number of variables permitted to enter was the number of variables under consideration. The default variables of 0.01 and 0.001 were used for the F value and tolerance parameters respectively.

Factor Analysis. As mentioned previously, because one of the Rotter questions was inadvertantly left out of the Keesler survey, a factor analysis was undertaken to determine the effect of the omission and whether the data was usable for further analysis in this thesis. Factor analysis is a statistical technique which examines a given data set to determine if subgroups or clusters of related variables exist. Specifically, data obtained with the Rotter I-E Scale is factor analyzed to ascertain if the 23 questions are measuring a central idea or concept (unidimensional) or if subscales exist within the measure which deal with several independent ideas (multidimensional). These subscales are identified because the questions within a given factor tend to correlate higher with each other than with the other questions (Nunnally, 1967).

Factor analysis is ordinarily accomplished in three

steps. First, a correlation matrix is prepared in which each question is correlated with every other question. Next, initial factors are extracted from the data. The first factor represents the best linear combination of each of the variables which accounts for the greatest amount of variance in the data. The next factor is the linear combination which accounts for the greatest amount of variance not accounted for by the first factor. This process continues until all of the variance in the data is accounted for. There is one initial factor for each question or variable. Associated with each initial factor is an eigenvalue which determines which of the initial factors are rotated to obtain a final solution, the third step.

Rotation of the factors is a process which attempts to clarify or simplify the factors to make them interpretable. Two major forms of rotation are employed: 1) orthogonal, where the factors are uncorrelated; and 2) oblique, where the factors may be correlated. Several rotational techniques are available within both of the rotation forms (Nie, et al., 1975). Because of its common use in other factor analysis studies of the Rotter measure, orthogonal varimax rotation was chosen for this study.

One decision which must be made in factor analysis is how many of the initial factors are rotated to obtain a final solution. One generally accepted practice is to rotate those factors with an eigenvalue greater than 1.0. The philosophy here is that the amount of variance explained by those factors

with eigenvalues less than 1.0 is not sufficient to warrant their rotation. Another approach is to plot the eigenvalues against their associated factor numbers. Typically, the plot falls rapidly for the first few factors then straightens out with a smaller slope to the last factor. Those factors which fall above the bend or "knee" on the plot are rotated. This method is referred to as the Scree Test (Harman, 1976). The rotation of eigenvalues greater than 1.0 was used in this study. An item with a loading of 0.40 or greater was considered to load on a given factor.

Abbreviation of Variable Names. Because of the large amounts of data which are represented in many of the tables in the remainder of this report, the abbreviation of many variable names is necessary. Table I contains a list of these abbreviations and the variables they represent.

<u>Abbreviation</u>	<u>Variable</u>
CHAL	Challenge
AUTO	Autonomy
ROT	Rotter (Q= 22 unless otherwise noted)
HOP	Hoppock
Fx	The xth factor from the factor analysis
TSRVCE	Time in service
CAREER	Career Intent
OFFAMN	Officer/airman split
MARIED	Married and single/ divorced, widowed and separated split
SENIOR	Field grade/Company grade split
RATING	Rated/Nonrated officer split
ENLIST	Staff Sergeant and above/Sergeant and below split
RACE	White/Nonwhite split

Table I: Abbreviations for Variable Names

Summary

This chapter has presented a detailed discussion of the analysis plan used in this study, the instrument used to obtain the data, the sample population, and the analytical techniques used to test the hypotheses of this thesis. No attempt has been made to present the equations upon which these tests are based. The interested reader may find these in the referenced material. The next chapter discusses other dimensionality studies of the Rotter measure and the results of the factor analysis study performed in this thesis.

IV. Factor Analysis of the Rotter Measure

Although the original purpose of the factor analysis study presented in this chapter was the determination of the effect of omitting one question from the Keesler survey, several other interesting findings have been made as a result of the analysis. The first topic covered in this chapter is a literature review of other dimensionality studies performed on the I-E Scale. Next, the results of the factor analysis of the data from Keesler and of the data obtained in another survey utilizing the Rotter measure are presented. It was the results of these analyses which determined the effect of the omission of the Rotter question. Finally, a comparison of the factor analysis performed on the survey data from this thesis and other dimensionality studies discussed in the literature review is made.

Previous Dimensionality Studies

In his original discussion of expectancy theory and the I-E Scale, Rotter (1966) discussed two factor analysis studies performed on the measure. The first, performed by Rotter himself, was based upon the responses of 200 male and 200 female college students. Although he does not present specific figures from the analysis, Rotter states, "... that much of the variance was included in a general factor" (Rotter, 1966:282). He also reports that several additional factors were found, but only a few items loaded on each of these factors and the amount of variance explained by these additional

factors was minimal.

The second study referred to by Rotter was conducted by Franklin (1963) in which he factor analyzed the responses of 1000 senior high school students to a questionnaire distributed by Purdue University. The survey was actually administered to over 9000 students, however, the 1000 used for factor analysis was a nationally representative sample, stratified by geographic region, grade in school, sex, and rural-urban community. The factor analysis resulted in one general factor accounting for 53% of the total scale variance. However, six of the first seven factors were rotated. Although no eigenvalues are given in the dissertation abstract consulted by this writer, Franklin identifies the six factors as: socio-political situation, general situation, efficacy of action, nonpersonal referent, specific situation, and personal referent. Concerning these findings, Franklin states:

It was concluded that the results strongly support the proposition that internal versus external control of reinforcement is an important, general behavioral variable (Franklin, 1963:1684).

The most detailed dimensionality study found by this writer was performed by Cherlin and Bourque (1974) in which the Rotter measure was distributed to two separate groups in the Los Angeles area following a severe earthquake in 1971. The first groups consisted of 161 students (96 female and 65 male) who were enrolled at Cal State University in Los Angeles, who felt the earthquake but were not in the immediate danger area. The second group was comprised of 100 residents

(53 female and 47 male) who lived in the hardest hit area during the quake.

Principal component analysis with orthogonal varimax rotation was used on both samples. Although five factors with eigenvalues greater than 1.0 (range of 4.4 to 1.3) were identified, only the first two factors were rotated. The variance accounted for by these factors was 29%. The remaining three factors with eigenvalues greater than 1.0 accounted for 6% each. The decision as to whether a given question loaded on a rotated factor was rather interesting and involved. Generally, if a loading of 0.40 or greater was found, the item was considered to load. A second criterion, however, was also used. An item with a loading of greater than 0.30 was included under two circumstances:

First, if the content ... clearly fit the analytical construct which dominated the factor; secondly, if it increased the reliability of the subscale without detracting from the clarity of the meaning (Cherlin and Bourque, 1974:568).

Factor loadings, then, were decided more on the meaning of a given factor than the numerical guidelines normally used. A breakdown of this analysis is presented in Appendix D.

The researchers came to several conclusions based upon their factor analysis. First, their results are inconsistent with the findings of Rotter (1966) and Franklin (1963) in that the I-E Scale appears to be multidimensional rather than unidimensional as reported in the earlier findings. Two distinct factors were identified for the college sample. For this data, the first factor appears to be:

a general reflection of the individual's expectancy of the extent to which his or her own actions - as well as the actions of most others - determine the course of life's events (Cherlin and Bourque, 1974: 569).

This factor was identified by the researchers as general control. The second factor included all of the politically oriented Rotter questions and was, therefore, labeled political control.

For the resident (non-college) group, this clear separation was not found. It was concluded that care must be taken when the Rotter measure is used with non-student populations. Three of the I-E Scale items are concerned with educational matters, and the conclusion was that these may not be suitable when students are not in the population. This conclusion does not impact on this study, however, since all three groups were involved as students, instructors, or staff personnel in academic and training environments.

Another analysis dealing with college students was performed at Ohio State University by Herbert L. Mirels (1970) in which he employed varimax rotation on a sample of 159 male and 157 female psychology students. Two factors were identified with eigenvalues greater than 1.0. The variance accounted for by these two factors was approximately 29% for both the male and female samples. Six items loaded higher than 0.40 on the first factor. Each of these items concerned the belief that ability and hard work are more important to success than luck. Additionally, each of the questions focused on the individual as the point of control.

The second factor was the political factor found by Cherlin and Bourque (1974), however, one of the politically oriented questions (Appendix A, Question 16) did not load on this factor.

The final analysis study reviewed by this writer was performed by Gurin, et al. (1969) and concerned the dimensionality of the Rotter scale when given to blacks. The survey, however, was a slightly modified version of the 29 item Rotter I-E Scale. Some of the Rotter questions were slightly rephrased to make them more meaningful to the 1695 black students (849 male and 846 female) who participated in this study. Additionally, another set of forced-choice questions were included "... to tap students beliefs about the operation of personal and external forces in the race situation in the United States" (Gurin, et al., 1969:35). Although varimax rotation was employed, the criteria for determining how many factors should be rotated was not discussed.

The four factors identified by these researchers were: 1) control ideology; 2) personal control; 3) system modifiability; and 4) race ideology. Those items loading under control ideology are similar to those labeled as general control in the previous studies. The personal control items were all phrased in the first person, indicating a belief that one can control his own destiny. The final two factors, however, consisted almost exclusively of those items that were added to the Rotter measure and those I-E Scale items

which were modified for the black population. It was not surprising to this writer, therefore, that separate and distinct factors were identified for these questions and that these factors were concerned with racially oriented considerations.

In summary, then, recent factor analysis studies of the Rotter measure have challenged the opinion originally held by Rotter that the I-E Scale is unidimensional. Several identifiable factors have been found, however, they do not appear specifically in any one study. Those factors which have been labeled thusfar are concerned with: 1) personal control; 2) general control ideology; and 3) political control. These items are further discussed in conjunction with this study later in this chapter.

The Effect of the Missing Rotter Question

The original purpose of this chapter, as mentioned previously, was to determine if the data obtained at Keesler was usable for further analysis since one of the Rotter questions had been omitted. In order to make this determination, it was decided to factor analyze the Keesler data and compare this analysis with another factor analysis of data obtained in another thesis employing the full 23 question I-E Scale. Captain Larry J. Corbin (1977) surveyed military and civilian scientists and engineers from the Air Force Flight Dynamics Laboratory (AFFDL) at Wright-Patterson. A total of 273 usable responses were obtained from AFFDL. The essence of the testing centered around a factor analysis of

Factor	Keesler Data X_1	% Var	AFFDL Q= 23 X_1	% Var	AFFDL Q= 22 X_1	% Var
1	3.94	17.9	4.72	20.5	4.64	21.1
2	1.94	8.9	1.63	7.1	1.63	7.4
3	1.47	6.7	1.42	6.2	1.42	6.5
4	1.30	5.9	1.38	6.0	1.38	6.3
5	1.17	5.3	1.16	5.1	1.12	5.1
6	1.04	4.7	1.12	4.9	1.06	4.9
7	0.99	4.5	1.00	4.4	1.00	4.5

Table II: Eigenvalues and Percent Variance
Accounted for by First Seven Factors

the AFFDL data with and without the missing Rotter question. A factor analysis was also performed on the Keesler data for comparison with the AFFDL data without the omitted question. The AFFDL sample reflected a slightly more internal orientation than the Keesler group, the means based on 22 questions being 7.81 and 8.07 respectively.

Principal factoring without iteration and with varimax rotation with the default eigenvalue criterion of 1.0 were used for all three samples. A summary of the eigenvalues and the percent of total variance accounted for by each of the factors is presented in Table II. An examination of the eigenvalues in Table II shows that six factors were rotated for the Keesler group while seven were rotated for both of the AFFDL samples. Because the seventh eigenvalue for the Keesler data is 0.99, it was also rotated, however, the interpretability of the factor was lessened and only six factors are discussed in the remainder of this study. A comparison of the AFFDL samples reveals that the eigenvalues

Item	F1	F2	F3	F4	F5	F6	F7
2	-.092	.053	.670	.217	.005	.041	.210
3	.434	.012	.067	.146	.391	.112	-.342
4	.100	.572	.368	-.209	.176	.194	-.112
5	.043	.152	.172	-.004	.108	.069	.602
6	.059	.637	-.078	.146	.245	.092	.100
7	.039	.114	.082	-.104	.608	-.076	.428
9	.037	.068	.050	.606	.192	-.027	-.296
10	.018	.052	-.097	.175	.212	.705	.216
11	.165	.529	.023	.330	-.017	.218	.157
12	.740	.175	-.050	.045	-.096	.102	.171
13	.251	.235	-.006	.471	-.010	.068	.041
15	.057	.178	.231	.588	-.079	.170	.109
16	.113	.708	.015	.077	.071	-.018	.163
17	.675	.158	.269	.141	.096	-.171	-.082
18	.246	.085	.483	.262	.101	.072	.414
20	.076	.129	.228	-.099	.656	.159	-.052
21	.100	.082	.763	-.008	.097	.000	-.001
22	.732	.100	.005	.142	.162	-.011	-.003
23	-.017	.180	.185	.023	.002	.747	-.166
25	.212	.453	.212	.450	-.187	-.113	.257
26	.023	.036	-.049	.399	.611	.048	.087
28	.119	.644	.168	.214	-.068	.084	-.080
29	.464	.071	-.020	-.030	-.038	.418	.101
<hr/>							
2	-.103	.042	.680	.101	.289	.024	.104
3	.513	.001	.065	.315	.013	.163	-.191
4	.135	.576	.336	.091	-.229	.240	.079
5	.024	.132	.105	.048	.011	.080	.810
6	.049	.622	-.067	.302	.227	.073	-.021
7	.030	.109	.087	.624	-.066	-.084	.383
10	.019	.020	-.125	.205	.206	.703	.260
11	.135	.497	.021	.050	.450	.185	.027
12	.695	.170	-.066	-.096	.148	.066	.132
13	.249	.192	-.007	.040	.523	.051	-.040
15	.055	.149	.232	-.023	.617	.148	.020
16	.100	.702	-.001	.083	.136	-.026	.161
17	.692	.168	.269	.057	.104	-.165	-.037
18	.218	.051	.465	.128	.367	.050	.372
20	.137	.143	.233	.593	-.205	.203	.060
21	.110	.106	.774	.073	-.021	.009	.005
22	.744	.089	-.008	.121	.125	-.007	.064
23	-.005	.193	.182	-.018	.030	.749	-.155
25	.209	.421	.186	.000	.482	-.120	.277
26	.041	.031	.010	.703	.383	.022	-.149
28	.139	.650	.149	-.094	.183	.099	.003
29	.431	.006	-.035	-.051	.050	.396	.090

Table III: Factor Loadings for AFFDL with (Top) and without (Bottom) Rotter Question 9

and the accompanying percentages are approximately equal with or without the missing question.

The next step was to compare the factor loadings on the rotated factors for the AFFDL samples. An item was considered to load on a given factor if the factor loading was 0.40 or higher. A summary of these factor loadings is presented in Table III. The upper set of loadings is for the sample containing the missing question (in Table III, Question 9); the lower is without the missing question. An examination of the first three factors for both of the samples reveals that the items considered to load on each of these factors are identical. Factor 5 of the 23 question sample also matches factor 4 of the other sample. Additionally, factor 6 for both samples is nearly identical with the exception of question 29. The loading for this item on the 22 question sample is .396 which, for all practical purposes, indicates a loading. The factors, then, do appear to be the same. A comparison of factor 4 of the first group and factor 5 of the second shows them to be the same except for item 9 for the upper sample and item 11 for the lower. It must be remembered, however, that question 9 is the missing Rotter question and it appears that it is on these factors that the primary impact is felt. Factor 7 is also somewhat similar for both samples in that item 5 loads in both cases. Although the other two questions (7 and 18) which load on the upper sample do not load above 0.40 on the lower, their values are 0.383 and 0.372 respectively which, again, provides a basic

similarity.

The above comparison provides the first evidence that the effect of omitting the Rotter question is minor for two reasons: 1) the factor loadings for both samples are quite similar - they are in fact identical for the first three factors, those accounting for the most variance; and 2) for the sample containing question 9, the loadings on factor 4 indicate that three other questions in the measure (13, 15, and 25) are concerned with a similar idea or concept. One of the primary uses of factor analysis is in the development of survey instruments where large numbers of questions are reduced by eliminating some of those which load on the same factor (Nunnally, 1967). Since question 9 loads with the other three items, this indicates that it may be omitted without eliminating the theme or idea captured by that factor.

An even stronger indication that the effect of omitting the one Rotter question is the correlation of the measure with and without that question. For this comparison, the AFIT data was utilized. For 114 responses, the Pearson product-moment correlation was .996 with a significance of .001.

When the AFFDL sample is compared to the Keesler data, only one of the factors shows any similarity. This tends to support the opinion that the Rotter measure may be sensitive to different populations. Because little similarity is found, the factor loadings for the Keesler data are not presented.

In summary, then, the above correlation and factor analysis studies present several important findings. First, the extremely high correlation between the Rotter measure with and without question 9 provides the strongest indication that the omission of this question has little or no effect on the validity of the measure. Second, the factor loadings with and without question 9 are very similar. Finally, question 9 loads on the same factor with three other questions, and, therefore, the omission of question 9 does not eliminate the measurement of the central idea of this factor. These findings lead this writer to conclude that the effect of the omission of this question is minimal and that the data is suitable for additional analysis.

The Dimensionality of this Thesis Data

In light of the previous dimensionality studies of the Rotter I-E Scale and the factor analysis study performed on the Keesler and AFFDL data, it was decided to conduct a further dimensionality study combining the Keesler data with both of the AFIT samples. One question which arises from the identification of a number of independent subscales within the Rotter measure is the validity of summing the individual questions to obtain a single score. Factor analysis aids in answering this question by providing information concerning the internal structure of a measure and whether all items in the instrument are measuring one central idea which may be indicated with a total score (Nunnally, 1967). This validity question provides additional impetus for this factor analysis.

	<u>Factor</u>	<u>Eigenvalue</u>	<u>% Var</u>			
	1	3.98	18.1			
	2	1.72	7.8			
	3	1.37	6.2			
	4	1.27	5.8			
	5	1.09	5.0			
	6	1.08	4.9			
			$\Sigma = 47.8$			
Item	F1	F2	F3	F4	F5	F6
2	.205	-.017	.281	.463	-.213	-.179
3	-.055	.502	.142	-.193	.041	.271
4	.156	.162	.028	.188	.634	.092
5	.299	-.004	.266	-.063	.518	.191
6	-.034	.257	-.075	.467	-.020	.009
7	-.311	.116	.428	.437	.196	.073
10	.149	.104	.372	.279	-.045	.303
11	.230	.079	.118	.609	.144	.146
12	.017	.722	.080	.196	.135	-.053
13	.618	.124	.055	-.136	.039	.239
15	.449	.028	.001	.272	.033	.334
16	.276	.136	-.166	.544	.059	.122
18	.159	.720	.198	.162	-.026	-.052
19	.482	.030	.093	.418	.018	-.049
20	.142	-.042	.603	.014	.227	-.010
21	.187	-.056	.352	.361	-.439	.126
22	.110	.594	-.101	.253	.142	-.198
23	.025	-.053	.040	.111	.121	.773
25	.638	.100	.144	.254	.072	.027
26	.087	.201	.666	-.068	-.077	.042
28	.638	.062	.117	.180	.119	-.260
29	.178	.549	-.069	.052	-.309	.189

Table IV: Factor Loadings and Eigenvalues for
Combined Keesler and AFIT Data (n= 338)

With the addition of the AFIT students, the sample size was increased to 338. The mean for the 22 Rotter questions was 8.32. A summary of the eigenvalues greater than 1.0 and their associated variance explained is shown in Table IV. Examination of Table IV shows that six factors were rotated with eigenvalues greater than 1.0 and that the total variance explained by these factors was 47.8%. Also included in

Factor 1

- 13. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
- 15. Many times we might as well decide what to do by flipping a coin.
- 19. Most people don't realize the extent to which their lives are controlled by accidental happenings.
- 25. Many times I feel that I have little influence over the things that happen to me.
- 28. Sometimes I feel I don't have enough control over the direction my life is taking.

Factor 2

- 3. There will always be wars no matter how hard people try to prevent them.
- 12. The world is run by the few people in power and there is not much the little guy can do about it.
- 18. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
- 22. It is difficult for people to have much control over the things politicians do in office.
- 29. Most of the time I can't understand why politicians behave the way they do.

Factor 3

- 7. No matter how hard you try some people just don't like you.
- 20. It is hard to know whether or not a person likes you.
- 26. There is not much use in trying too hard to please people; if they like you, they like you.

Table V: Factors with Rotter Questions

Factor 4

2. Many of the unhappy things in peoples' lives are partly due to bad luck.
6. Without the right breaks one cannot be an effective leader.
7. No matter how hard you try, some people just don't like you.
11. Getting a good job depends mainly on being in the right place at the right time.
16. Who gets to be to boss often depends on who was lucky enough to be in the right place first.
19. Most people do not realize the extent to which their lives are controlled by accidental happenings.

Factor 5

4. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
5. Most students don't realize the extent to which their grades are influenced by accidental happenings.
21. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

Factor 6

23. Sometimes I can't understand how teachers arrive at the grades they give.

Table V: (Continued)

Table IV are the factor loadings associated with the rotated factors. Selecting a minimum loading of 0.40 again for a question to be considered as loading on a given factor, a general pattern is seen to develop in some of the factors. Table V presents each of the factors with the actual Rotter questions which load on the given factor. The questions have

been renumbered to correspond with the numbering used in the articles covered in the literature review. With the exception of question 21, factor 5, the external phrase is presented. The internal phrase is chosen for question 21 because the factor loading for this question is negative.

If one examines the full questions which load on factor 1 (Appendix A, Questions 26, 28, 32, 38, and 41 respectively), it is seen that four of the five questions are concerned with the ability of the individual to control his personal destiny. Although question 32 could also be interpreted along similar lines, the explicit use of the first person is not found. Two possible explanations are seen by this writer for the loading of this question: 1) the question which was omitted from the survey (Appendix A, Question 43) is also worded in the first person and loaded with the other first person questions in the Gurin, et al. (1969) study, and its omission may have caused the loading of question 32; or 2) question 32 is projective in nature and captures the essence of the factor, namely personal control. For whatever the reason, question 32 does load on this factor and is included in further analysis with this factor in the next chapter. Because the apparent theme of the factor is the control of one's own destiny, this writer chooses to label this factor personal control.

Factor 2 is consistent with each of the previous studies and with the AFFDL data. Each of the questions loading on this factor are politically oriented. This factor is clearly

identified as political control.

The third factor contains three questions. Each refers to the ability or inability of the individual to get along with or be liked by others. This factor was also present in the AFFDL factor analyses. Because the questions refer to the relationship of the individual to others, this writer has labeled this factor as interpersonal control.

Factor 4 appears to deal with some general philosophy concerning success on the job, one's relationship with others, and whether the respondent actually believes in luck. In the Gurin, et al. (1969) study, all of these items with the exception of question 19 load under the control ideology factor. Since question 19 also deals with a general belief in luck, this writer chooses to label this factor as general control.

Factors 5 and 6, on the other hand, do not present a picture which is clear within itself. Questions 4 and 21 seem more appropriately associated with factor 4, general control. Question 5 of factor 4 and question 23 of factor 6 deal with educational matters. It is interesting to note that the other education question, item 10, does not load above 0.40 on any factor. Because of the ambiguity of these factors, this writer chooses not to label them at this time.

In summary, then, four of the six rotated factors have been labeled as: 1) personal control; 2) political control; 3) interpersonal control; and 4) general control. The

interpersonal control factor represents a departure from previous findings. Although it can be argued that this factor is also appropriate under general control, it was distinctly identified for this and the AFFDL samples. This writer, therefore, chooses to maintain it as a separate factor.

Validity and Reliability

As discussed previously, the identification of independent subscales within the Rotter measure raises some serious doubts whether the individual questions may be summed to obtain a single score indicating one central theme - internal versus external control. This also raises the question of whether one can speak of one group being more internal or external than another. This categorization, however, is the basis for each of the hypotheses proposed in this study.

Because of the above validity question, it was also decided to investigate the reliability of the I-E Scale. Reliability here means internal consistency or does the instrument measure the same thing or things when given to a number of different subjects? Nunnally (1967) recommends the "coefficient alpha" test as the first test of internal consistency to be performed. The range on coefficient alpha is from 0 to 1. The higher the score, the more reliable the measure. The coefficient alpha computed for the 22 question Rotter scale with the combined Keesler and AFIT data was 0.77. This indicates a high degree of internal consistency.

A second test also recommended by Nunnally (1967) is

the "split half" test which consists of arbitrarily dividing the questions from the instrument into two groups. Scores for each half are then obtained and correlated. The correlation obtained with the combined data sample ($n = 338$) was, again, 0.77, which is also a strong indication of high internal consistency.

The conclusion which this author derives from the validity and reliability testing of the Rotter measure used in this study is as follows: although the exact nature of the ideas or concepts which are measured by the I-E Scale is not clearly defined, they are consistently measured when given to different subjects.

Summary

Several important conclusions are drawn from the results of the factor analysis and reliability studies presented in this chapter. First, the omission of the Rotter question from the Keesler data has minimal impact on the structure of the factors found in the Rotter measure. This fact, combined with the high correlation between the Rotter scale with and without the missing question, leads to the conclusion that the Keesler data and the AFIT data may be combined for subsequent analysis.

Secondly, the Rotter measure appears to be multidimensional with four of the six factors identified as: 1) personal control; 2) political control; 3) interpersonal control; and 4) general control. The identification of these factors or subscales, however, raises some doubt

whether the Rotter concept of internal-external control is validly measured by the summed total of the Rotter questions. Whatever the concepts or ideas measured by this instrument, they are measured consistently when administered to different subjects.

Finally, the primary purpose of this study is to examine the relationship of the Rotter measure with various other aspects of the work environment. Although the validity of the measurement of a single concept is in doubt, the relationship is still examined in the next chapter. Any reference to a degree of internal or external orientation, however, must be tempered by the questions raised in this chapter. For this reason, the factors which have been identified are also examined whenever the 22 question Rotter measure is discussed.

V. Findings

The purpose of this chapter is to discuss the results of the analysis of the survey data. In accordance with the analysis plan established in Chapter 3, a discussion of the correlations among the variables is presented first. Next, the relationship among the variables of job satisfaction, job challenge, autonomy, and the Rotter I-E Scale is explored. Finally, the remaining hypotheses dealing with differences in the internal-external orientation of various groups is discussed. Again, it must be remembered that as a result of the factor analysis study, any reference to one group displaying a higher degree of internal or external orientation is clouded by the validity questions raised in Chapter 4. In order to investigate this issue further, additional analysis with the four factors identified previously was performed and is presented here. It must be remembered, however, that these factors are the sums of the responses for the individual questions contained in the factors and not the traditional factor scores which are computed under SPSS.

Correlation Analysis

As mentioned previously, the purpose of the correlation analysis presented here is to provide an indication of the relationships between the variables and a basis for further analysis in the regression study discussed later in this chapter.

	AUTO	ROT	HOP	F1	F2	F3	F4
CHAL	.434**	-.098*	.644**	-.081	-.081	-.008	.026
AUTO		-.158**	.518**	-.154**	-.102*	-.112*	-.078
ROT			-.193**	.738**	.654**	.540**	.772**
HOP				-.164**	-.088	-.084	-.113*
F1					.292**	.218**	.584**
F2						.206**	.343**
F3							.424**

Note: ** indicates $P < .001$
* indicates $P < .05$

Table VI: Pearson Correlations for Work-Related Variables (n = 338) See Table I for Abbreviations.

Table VI is the zero-order correlation matrix for the variables considered in the first hypothesis. It can be seen from this matrix that job satisfaction (HOP) is significantly correlated at the .001 level with job challenge, autonomy, the 22 question Rotter I-E Scale, and the personal control factor (F1). The negative correlations associated with the Rotter measure and the four factors indicate that the lower (more internal) the score on these measures, the higher the score on the correlated variable.

Job challenge provides the highest correlation with job satisfaction. The second highest correlation is seen in job autonomy. These two variables, however, are also highly correlated with each other. This indicates to this writer that one of these variables may be driving the correlation between job satisfaction and the remaining variable.

Table VI also indicates that the degree of perceived autonomy is significantly correlated ($-.158$, $P < .001$) with the Rotter score. The interpretation here is that the more

internal the respondent's orientation, the higher his perceived level of autonomy. In other words, the more an individual feels that he is responsible for his success or failure, the more he perceives freedom of decision on the job. It is also interesting to note that this perception of autonomy is correlated with the personal control factor at exactly the same level ($-.154, P < .001$). Political control (F2) and interpersonal control (F3) are also correlated but at a lower significance level.

Although most of the demographic variables have been converted into dichotomous splits and are, therefore, more suitable for consideration under difference in means testing, time in service and career intent were not split and the correlation analysis has yielded significant results.

	HOP	ROT	CHAL	AUTO	F1	F2	F3	F4
TSRVCE	.132*	-.096*	.065	.091*	.011	-.123*	-.100*	-.129*
CAREER	-.289**	.094*	-.206**	-.194**	-.010	.131*	.055	.013
Note:	** indicates $P < .001$							
	* indicates $P < .05$							

Table VII: Pearson Correlations for Time in Service and Career Intent ($n = 338$)
See Table I for Abbreviations.

Table VII contains the zero-order correlations for time in service and career intent with the work-related variables discussed previously. As seen in Table VII, the highest correlation with job satisfaction is career intent ($-.289$). The negative sign is due to the reverse order found in the

scoring of career intent. This correlation, then, is interpreted as indicating that those expressing a likelihood of remaining in the Air Force for a career, also express higher levels of job satisfaction. A relationship of this type is not surprising. A secondary correlation (.132, $P < .05$) is also found between time in service and job satisfaction. This also indicates that the longer an individual remains in the Air Force, the higher is his expressed level of job satisfaction.

Significant correlations are also found between the Rotter measure and both time in service and career intent. These correlations indicate that the longer an individual remains in the Air Force and the stronger his intention to make the Air Force a career, the more internal his orientation.

An examination of the correlations obtained by using the 22 question Rotter measure and those for the separate factors yields some interesting results. First, it should be noted, that while the 22 question measure is significantly correlated with both time in service and career intent, not all of the factors show the same significance. Additionally, those factors which are significant yield higher correlations than the 22 question measure. In all of the correlation analysis for this study, however, there is no instance where one of the factors is significantly correlated without the 22 question measure also being significant. These results further indicate the value of examining the separate factors whenever the Rotter measure is analyzed in this study and further supports

Group 1: Group 2:	High Challenge, N= 190 Low Challenge, N= 148					High Autonomy, N= 191 Low Autonomy, N= 147					Internal (Rotter 22), N= 177 External (Rotter 22), N= 161					
<u>VARIABLE</u>	<u>GRP</u>	<u>MEAN</u>	<u>SD</u>	<u>t</u>	<u>2-TAIL PROB</u>	<u>GRP</u>	<u>MEAN</u>	<u>SD</u>	<u>t</u>	<u>2-TAIL PROB</u>	<u>GRP</u>	<u>MEAN</u>	<u>SD</u>	<u>t</u>	<u>2-TAIL PROB</u>	
HOPPOCK	1	21.4	2.8	11.61	.000	1	20.9	3.2	7.76	.000	1	20.2	3.2	3.69	.000	
	2	17.1	3.7			2	17.8	3.9			2	18.7	3.8			
CHALLENGE		NOT APPLICABLE					1	3.9	1.0	7.38	.000	1	3.6	1.0	1.64	.103
						2	3.1	.9			2	3.5	1.1			
AUTONOMY	1	5.1	1.3	7.87	.000	NOT APPLICABLE					1	4.8	1.5	3.15	.002	
	2	3.8	1.7								2	4.2	1.7			
ROTTER	1	8.0	4.0	-1.44	.150	1	8.0	4.2	-1.83	.068	NOT APPLICABLE					
	2	8.7	4.2			2	8.8	4.0								

Table VIII: t Tests Based on Splits in Challenge, Autonomy, and Rotter

the contention that the Rotter measure is multidimensional.

Job Satisfaction, Challenge, Autonomy, and Rotter

The analysis presented in this section was performed in conjunction with the first hypothesis of this thesis: there is a positive relationship among the variables of job satisfaction, job challenge, autonomy, and Rotter's Internal--External Control measure. Additional analysis concerning the four factors previously identified is also included.

Table VIII presents the results of means testing for each of the work-related variables split according to three criteria: high versus low job challenge, high versus low autonomy, and internal versus external control using the 22 question Rotter measure. The determination of high or low in each of the three categories is, again, based upon the mean for that variable. The t test for the variable upon which the split is made (e.g. challenge when groups are high versus low job challenge) is omitted since the means for the groups are always significantly different.

As expected, due to the high correlation between job satisfaction and job challenge, the t test for the Hoppock measure when the groups are those perceiving high challenge versus low challenge provides the largest difference in means. For the same two groups, the perceived autonomy is also significantly different. For the high autonomy group versus the low autonomy group, there is again a significant difference in perceived levels of job satisfaction and job challenge. Although the correlation analysis presented in

Table VI indicates significant differences in internal and external orientation between the high and low challenge and high and low autonomy groups, the t tests in Table VIII for these groups do not indicate these significant differences. When the Rotter measure is used for group determination, there is a significant difference in perceived levels of autonomy. Job satisfaction is also significantly higher for internals than externals. The impact of challenge and autonomy on this difference, however, cannot be determined.

Because of the possible influence of job challenge and autonomy on the job satisfaction levels of internals versus externals, it was necessary to control the effect of these variables in order to determine if true differences exist in job satisfaction based on locus of control. In order to provide this control, four combinations of t tests were performed in which the levels of challenge and autonomy were held the same for each of the groups. Only internal and external control were used to separate these groups. The four combinations of challenge and autonomy tested were: high challenge and autonomy, low challenge and autonomy, low challenge and high autonomy, and high challenge and low autonomy. Table IX presents the results of the four sets of t tests for the Hoppock job satisfaction scores. In order to investigate further the predictive power of the factors in comparison with the 22 question Rotter measure, these tests were also performed basing the group differences on: factor 1, personal control, and factor 4, general control. Factors 2

I-E by Rotter, 22 Questions						I-E by Factor 1						I-E by Factor 4					
GRP	N	MEAN	SD	t	2-TAIL PROB	GRP	N	MEAN	SD	t	2-TAIL PROB	GRP	N	MEAN	SD	t	2-TAIL PROB
Group 1: High Challenge, High Autonomy, External Group 2: High Challenge, High Autonomy, Internal																	
1	53	21.4	2.3	-2.20	.030	1	57	21.8	2.1	-.70	.482	1	45	21.3	2.3	-2.17	.031
2	86	22.3	2.2			2	86	22.0	2.5			2	94	22.2	2.3		
Group 1: Low Challenge, Low Autonomy, External Group 2: Low Challenge, Low Autonomy, Internal																	
1	48	15.9	3.8	-2.03	.045	1	48	15.8	3.7	-2.44	.017	1	29	16.1	4.0	-.70	.370
2	48	17.4	3.6			2	48	17.6	3.7			2	67	16.9	3.7		
Group 1: Low Challenge, High Autonomy, External Group 2: Low Challenge, High Autonomy, Internal																	
1	28	18.5	3.5	.98	.329	1	26	18.3	3.5	.57	.569	1	18	18.2	2.7	.28	.778
2	24	17.6	3.3			2	26	17.8	3.3			2	34	17.9	3.7		
Group 1: High Challenge, Low Autonomy, External Group 2: High Challenge, Low Autonomy, Internal																	
1	32	18.9	3.1	-3.11	.003	1	29	19.0	3.3	-2.15	.037	1	28	19.0	3.3	1.83	.073
2	19	21.6	3.0			2	22	21.0	3.2			2	20	20.6	3.2		

Table IX: t Tests of Job Satisfaction Splitting on Internal-External Control as Defined by Rotter (22 Questions), Factor 1, and Factor 4

and 3 were not considered because of their low correlations with job satisfaction.

In considering the 22 question Rotter scale, Table IX indicates that locus of control is a significant variable for expressed levels of job satisfaction for those who perceive their jobs as challenging and providing autonomy. Almost exactly the same difference, however, is also indicated when factor 4, general control, is used to separate the groups. When the personal control factor is used to define the groups, no significant differences in job satisfaction are found. This appears to be contradictory to the ideas set forth when the original hypothesis was proposed. Whether or not the individual perceives that he is in control of the successes or failures in his life was expected to be the deciding factor in the relationship between internal--external control and job satisfaction. This personal acceptance of responsibility, however, may not be synonymous with the personal control factor found in the factor analysis. This possible contradiction is further explored in the regression analysis section which follows.

For those who perceive their work as not challenging and not providing autonomy, a different pattern appears. The Rotter measure again provides for significant differences in expressed levels of job satisfaction. For these groups, however, the use of factor 4 does not provide for differences as it did in the high challenge and autonomy case. This time, factor 1, personal control, yields the significant differences.

When compared with the Rotter score, factor 1 provides a more significant split in job satisfaction. This again indicates that internals are more highly job satisfied than externals.

For the high challenge, low autonomy groups, the pattern of differences is the same as for the low challenge and autonomy groups. This time, however, the 22 question Rotter measure provides a more significant indication of differences in job satisfaction levels than the personal control factor. Factor 4, general control, produces no significant differences. In considering the 22 question Rotter measure and factor 1, those indicating an internal orientation are, again, significantly more job satisfied than externals. This indicates to this writer, in this situation, although the internal does not perceive that the organization is providing him with the autonomy to meet the challenge of his position, he still perceives success or failure as dependent on his own abilities or inabilities. This type of personal autonomy, which the internal perceives, may combine with the high challenge to increase his job satisfaction. The external, on the other hand, does not make this association and may, therefore, feel frustrated and attain a lower level of satisfaction.

With the low challenge, high autonomy groups, an interesting reversal occurs. For these groups, none of the measures provide for differences in job satisfaction. This is the only situation in which at least one of the measures has not indicated that internals are significantly more job satisfied

than externals. A possible explanation for this is that, although the internal feels that he has autonomy, the work does not provide sufficient challenge for him to utilize this freedom in a meaningful and rewarding manner. This places him in a similar position as the external who, although he perceives that the organization provides him with the freedom to act, does not make as strong an association between his abilities and success or failure. The two groups, therefore, have similar levels of job satisfaction.

In summary, then, the above analysis in which the degree of autonomy and challenge was held constant revealed that, in general, internals express higher levels of job satisfaction than externals. The exception occurred when the groups perceived low challenge and high autonomy. In this instance, the high autonomy for the internals is not needed for the low-challenging job, placing them on a similar plane with the externals who do not perceive autonomy as important because they do not make as strong an association between their actions and their successes or failures.

The analysis also shows that the personal control factor, factor 1, produces similar differences as the Rotter measure in positions yielding low challenge and high autonomy or high challenge and low autonomy. Factor 4, general control, however, provides corresponding differences with the Rotter measure in situations providing high challenge and high autonomy. These results further emphasize and support the earlier conclusion that the Rotter measure is multidimensional.

Regression Analysis

Based upon the correlation analysis, difference in means testing, and the desire to formulate a model involving the work-related variables in Hypothesis 1, two regression analyses were performed. In addition to the work-related variables, however, several demographic variables and all of the split variables based on the demographic data were also included for consideration.

In the first regression, job satisfaction (HOPPOCK) was the criterion variable. The predictor variables were: challenge; autonomy; the 22 question Rotter scale; sex; time in service; career intent; officer/airman; married or single/divorced, widowed, or separated; white/non-white; rated/non-rated; field grade/company grade officers; and Staff Sergeant and above/Sergeant and below.

<u>VARIABLE</u>	<u>F VALUE</u>	<u>SIG</u>	<u>MULT R</u>	<u>R SQUARE</u>	<u>CHG R SQUARE</u>	<u>SIMPLE R</u>
CHALLENGE	238.7	.000	.644	.415	.415	.644
AUTONOMY	45.3	.000	.696	.485	.070	.518
CAREER	11.2	.001	.703	.502	.017	-.289
ROTTER	5.5	.020	.714	.510	.008	-.193

Table X: Regression 1 - Variables
with Significance < .05

Table X contains the variables which entered the regression with a significance of .05 or less. Challenge, as predicted by the correlation analysis, entered the regression first.

This variable accounted for 41.5% of the total variance. The second variable to enter was job autonomy, however, this variable only accounted for 7% of the remaining variance. The variables of career intent and the Rotter 22 question score entered third and fourth respectively. Again, however, the amount of additional variance accounted for by these variables was only 2.5% combined. With all four variables in the regression equation, the model accounts for 51% of the variance in expressed job satisfaction. It is interesting to note that career intent was the only non work-related variable to enter the regression equation with a significance of .05 or less.

The second regression utilized the four factors, which have been previously discussed, instead of the 22 question Rotter measure. This was done to provide a final look at which factors are most useful in a model of job satisfaction. Career intent was again included for consideration.

<u>VARIABLE</u>	<u>F VALUE</u>	<u>SIG</u>	<u>MULT R</u>	<u>R SQUARE</u>	<u>CHG R SQUARE</u>	<u>SIMPLE R</u>
CHALLENGE	238.7	.000	.644	.415	.415	.644
AUTONOMY	45.3	.000	.696	.485	.070	.518
CAREER	11.2	.001	.703	.502	.017	-.289
F4	7.3	.007	.716	.512	.010	-.113

Table XI: Regression 2 - Variables
with Significance < .05

Table XI contains the variables which again entered with

a significance of .05 or less. The first three variables, challenge, autonomy, and career intent, remained, as expected, unchanged. The only factor from the Rotter measure which also entered the regression was the general control factor, F4. It is also interesting to note that this six-question factor accounted for the same amount of additional variance in the model as the 22 question measure did in the first regression. For this model also, the total variance accounted for was 51.2%.

In the original discussion of the Rotter I-E Scale and its potential relationship with job satisfaction, challenge, and autonomy, it was suggested that an individual who perceives that he is responsible for success or failure in his life, is challenged by his job, and has autonomy, should be highly job satisfied. In viewing each of the identified factors, it appeared to this writer that this view of control was best typified by factor 1, personal control. The results of this second regression and of the earlier means testing, however, indicate that factor 4, general control, plays a far more important role in this relationship. An examination of Table VI reveals that factor 1, personal control, is significantly correlated with autonomy ($-.154, P < .001$). Factor 4, general control, however, does not show this significance. As explained in Chapter 3, a variable is chosen to enter a regression equation because it explains the maximum amount of additional variance not explained by the variables already in the equation. Because of the correlation

between autonomy and factor 1, the amount of variance to be explained by factor 1 has apparently been accounted for by the autonomy variable. Since factor 4 has the next highest and only other significant correlation with job satisfaction, it enters the regression. In the means testing also, the autonomy level was held the same and the split made on the basis of internal-external control. Again, the correlation between autonomy and factor 1 apparently prevented factor 1 from causing significant differences when it was used to determine locus of control. The significant correlation between factor 4 and job satisfaction, however, and the lack of correlation between factor 4 and autonomy permitted this factor to cause significant differences in mean job satisfaction levels.

In summary, then, the above regression analysis indicates again that job challenge and autonomy are the "best" of the predictors utilized in this study to account for variance in job satisfaction. This analysis also indicates that career intent and the Rotter I-E Scale are significant to the overall model, however, the additional variance explained by these factors is minimal. Additionally, the six-question general control factor obtained from the Rotter measure provides as much information for the overall model as the full 22 question instrument provides. Finally, it is concluded that the analysis supports the first hypothesis of this thesis that there is a positive relationship among the variables of job satisfaction, job challenge, autonomy, and the Rotter I-E Scale.

VARIABLE	Group 1: Group 2: Airmen, N= 189 Officers, N= 149				Company Grade, N= 130 Field Grade, N= 19				Males, N= 320 Females, N= 18			
	GRP	MEAN	SD	1-TAIL t	GRP	MEAN	SD	1-TAIL t	GRP	MEAN	SD	1-TAIL t
HOPPOCK	1	19.4	3.9	-.83	1	19.7	3.7	.30	1	19.5	3.8	-.29
	2	19.7	3.8		2	19.5	4.3		2	19.8	4.3	
ROTTER	1	7.9	3.9	-1.92	1	8.9	4.4	.53	1	8.2	4.0	-2.74
	2	8.8	4.3		2	8.3	3.9		2	10.9	4.8	
CHALLENGE	1	3.5	1.0	-1.91	1	3.7	1.0	.41	1	3.5	1.0	-1.43
	2	3.7	1.0		2	3.6	1.1		2	3.9	1.3	
AUTONOMY	1	4.4	1.6	-2.13	1	4.7	1.7	.02	1	4.5	1.6	.83
	2	4.7	1.7		2	4.7	1.6		2	4.2	1.9	
F1	1	1.5	1.4	-1.20	1	1.7	1.4	-.65	1	1.6	1.4	-1.43
	2	1.7	1.4		2	1.9	1.5		2	2.1	1.3	
F2	1	2.5	1.5	.29	1	2.5	1.5	1.31	1	2.4	1.5	-.78
	2	2.4	1.5		2	2.0	1.7		2	2.7	1.6	
F3	1	1.5	1.0	.19	1	1.5	1.1	1.94	1	1.4	1.0	-3.03
	2	1.5	1.0		2	1.1	.7		2	2.2	1.0	
F4	1	1.7	1.4	-4.41	1	2.5	1.6	.53	1	2.0	1.5	-2.13
	2	2.4	1.6		2	2.3	1.3		2	2.8	1.3	

Table XII: t Tests for Demographic Split-Variables

VARIABLE	Group 1: Non-white, N= 37				Group 2: White, N=301				Divorced/Separated/Widow, N= 16				Staff and Above, N= 145				Sergeant and Below, N= 44			
	GRP	MEAN	SD	t	1-TAIL PROB	GRP	MEAN	SD	t	1-TAIL PROB	GRP	MEAN	SD	t	1-TAIL PROB	GRP	MEAN	SD	t	1-TAIL PROB
HOPPOCK	1	18.6	4.2	-1.61	.056	1	19.9	4.2	.38	.394	1	19.9	3.7	3.38	.001	1	19.9	3.7	3.38	.001
	2	19.6	3.8			2	19.5	3.8			2	17.7	4.1			2	17.7	4.1		
ROTTER	1	9.6	4.2	1.95	.026	1	8.2	4.5	-.13	.446	1	7.9	4.1	-.55	.292	1	7.9	4.1	-.55	.292
	2	8.2	4.1			2	8.3	4.1			2	8.2	3.3			2	8.2	3.3		
CHALLENGE	1	3.4	1.1	-.90	.184	1	3.6	.9	.30	.384	1	3.6	1.0	2.76	.003	1	3.6	1.0	2.76	.003
	2	2.6	1.0			2	3.5	1.0			2	3.1	1.2			2	3.1	1.2		
AUTONOMY	1	4.4	1.6	-.50	.308	1	4.9	1.5	.86	.196	1	4.5	1.6	1.63	.053	1	4.5	1.6	1.63	.053
	2	4.5	1.6			2	4.5	1.6			2	4.0	1.6			2	4.0	1.6		
F1	1	2.1	1.4	2.25	.013	1	2.0	1.6	1.18	.119	1	1.5	1.0	1.80	.037	1	1.5	1.0	1.80	.037
	2	1.5	1.4			2	1.6	1.4			2	1.2	1.2			2	1.2	1.2		
F2	1	2.7	1.6	1.08	.141	1	2.6	1.6	.31	.380	1	2.4	1.5	-1.40	.082	1	2.4	1.5	-1.40	.082
	2	2.4	1.5			2	2.4	1.5			2	2.8	1.4			2	2.8	1.4		
F3	1	1.8	1.0	2.30	.011	1	1.1	1.1	-1.51	.066	1	1.5	1.0	-.38	.352	1	1.5	1.0	-.38	.352
	2	1.4	1.0			2	1.5	1.0			2	1.5	1.0			2	1.5	1.0		
F4	1	2.2	1.5	.72	.238	1	1.8	1.4	-.65	.258	1	1.8	1.4	1.22	.113	1	1.8	1.4	1.22	.113
	2	2.0	1.5			2	2.1	1.5			2	1.5	1.2			2	1.5	1.2		

Table XII: (Continued)

Group 1: Rated Officers, N= 54
 Group 2: Non-Rated Officers, N= 96

<u>VARIABLE</u>	<u>GRP</u>	<u>MEAN</u>	<u>SD</u>	<u>t</u>	<u>2-TAIL PROB</u>
HOPPOCK	1	19.7	3.6	-.03	.975
	2	19.7	4.0		
ROTTER	1	8.8	3.9	-.05	.963
	2	8.8	4.6		
CHALLENGE	1	3.8	1.0	.75	.452
	2	3.6	1.0		
AUTONOMY	1	4.5	1.6	-1.59	.113
	2	4.9	1.7		
F1	1	1.8	1.4	.73	.464
	2	1.7	1.4		
F2	1	2.2	1.4	-1.20	.230
	2	2.6	1.6		
F3	1	1.5	1.0	.36	.720
	2	1.4	1.0		
F4	1	2.4	1.4	-.16	.873
	2	2.5	1.6		

Table XII: (Continued)

Remaining Hypotheses

This section presents the results of the analysis performed in testing the remaining eight hypotheses proposed in Chapter 1. Table XII presents the t tests performed for seven of these hypotheses. Once again, in addition to the work-related variables, means testing was also performed on the four factors discussed previously. For those hypotheses which deal with one group being more internal than the other group, the one-tailed probability is shown. For the rated

versus non-rated group, however, the hypothesis refers only to a difference and, therefore, the two-tailed test is appropriate.

Hypothesis 2: Officers are more internally oriented than enlisted personnel.

This hypothesis is based upon the study of managers, supervisors, and workers performed by Andrisani and Nestel (1970) in which managers were found to be more internally oriented than supervisors who were, in turn, more internal than workers. A general analogy may be formed comparing the managers to the Air Force officers, the supervisors with the senior NCO's, and the workers with the lower ranking enlisted personnel. Based upon this analogy, therefore, the hypothesis that officers are more internal than enlisted personnel is made.

Examination of Table XII reveals, however, that the mean Rotter score for the officer group was 8.81 while the mean for the enlisted personnel was 7.94. If the one-tailed critical significance level is set at .025, the Rotter measure provides a weak indication ($\alpha = .028$) that the enlisted personnel, not the officers, are more internally oriented. Looking at the four identified subscales, F4, the general control factor, strongly supports the hypothesis that enlisted personnel are more internal than officers and further supports and probably accounts for the indicated difference in the 22 question Rotter measure. Both groups expressed equivalent

levels of job satisfaction, however, the officers perceived a significantly higher level of job autonomy. Although they also perceived more challenge, the significance of .028 was, again, above the critical level of .025.

Based upon the means test, therefore, the data does not support the hypothesis that officers are more internal than enlisted personnel. The data does, however, support a reversal of the hypothesis with the enlisted personnel being more internally oriented than the officers.

Because of the work by Andrisani and Nestel (1970), it is doubtful to this writer that the above reversal holds for the entire Air Force. The reversal found in this data, however, may be based on the sample of officers used, AFIT students. In most instances, the students had recently completed a PCS move, have found themselves in an academic environment where they have little input into the courses they must take, and have encountered many other potentially externalizing effects. Before any final conclusions can be drawn concerning the locus of control differences between officers and enlisted personnel, a study utilizing personnel from throughout the Air Force is required.

Hypothesis 2: Field grade officers (Lieutenant Colonel and Major) are more internal and job satisfied than company grade officers.

Again considering the work of Andrisani and Nestel (1976), another parallel can be made between upper-level managers or

field grade officers and lower-level managers or supervisors and company grade officers.

Examination of Table XII for the field versus company grade groups does not reflect this difference for either the Rotter scale or the Hoppock measure. On the other hand, factor 3, interpersonal control, does indicate that the 19 field grade officers tend to be more internally oriented concerning the control one has over being liked. The significance level is slightly above the critical level, however, and, therefore, the data only weakly supports this hypothesis.

Hypothesis 5: Males are more internally oriented than females.

This hypothesis is based upon the findings of Feather (cf Joe, 1971) and Rotter (1966). Table XII indicates that the 18 females were significantly more external than the 320 males based upon the entire Rotter measure. It appears that the interpersonal and general control factors (F3 and F4) are the primary contributors to this difference. The personal and political control factors (F1 and F2) reflect no differences, and the perceived levels of job satisfaction, challenge, and autonomy are also the same.

The significant differences for the interpersonal and general control factors indicate that women consider success in general and the act of being liked to be more determined by chance than do men. The questions on the general control factor deal heavily with success on the job. The external

orientation concerning success on the job is, perhaps, an indication that women in the Air Force do not recognize or perceive the effect of the equal rights movement when applied to the Air Force.

Hypothesis 5 is, therefore, supported by the data.

Hypothesis 6: Minorities (blacks, Spanish Americans, Mexican Americans, etc.) are more external than whites.

As indicated by the studies of Battle and Rotter (1963), Lefcourt and Ladwig (1965), and Gurin, et al. (1969) which were discussed in Chapter 2, a major portion of the research involving the Rotter Internal-External Control measure has been designed to determine if differences in orientation exist between various ethnic and social groups. According to Table XII, when the Rotter measure is used to determine locus of control, the one-tailed significance level (.026) lies at the critical level. The personal and interpersonal control factors, F1 and F3 respectively, again reflect a much stronger significance while the political and general control factors, F2 and F4, are approximately equal. The significant differences presented by the interpersonal and personal factors provide sufficient evidence to support the acceptance of hypothesis six.

It is interesting to compare the results of the analysis concerning the racial minorities with those of the women since both groups have been actively involved in an equal rights

movement for some time. Both of the groups are externally oriented regarding the interpersonal factor , thereby indicating that being liked is based upon factors beyond their control.

For the minorities, the lack of significant differences based upon the general control measure indicates to this writer that they perceive advances in the general control area, part of which concerns the job/working environment. However, success on a personal basis or in interpersonal relations is still perceived as being controlled by chance.

For the women, the opposite situation has developed. The women apparently perceive that success on the job is still a matter of luck while success on a personal basis is generally under their control.

Whether or not these proposed comparisons or explanations are accurate, the differences between the groups again indicate the multidimensional nature of the Rotter instrument and the effect that different factors have on different groups of respondents. It may be these differences which account for the sensitivity to population which the Rotter measure has exhibited.

Hypothesis 7: Married and single personnel are more internal than divorced, separated, or widowed personnel.

As mentioned previously, this hypothesis was included in this study because of an interest by this writer in the effect

that a highly emotional situation, such as divorce or the loss of a loved one, has on the internal-external orientation of an individual. This idea was suggested by the work performed by Cherlin and Bourque (1974) in which respondents in and near an earthquake were compared to determine if the disaster produced an externalizing effect on those closest to the damage. Table XII indicates that no significant differences are obtained when any of the measures are employed. This may indicate that if the divorce, separation, etc. does produce any externalizing effect at all, the effect of the experience is not significant after the initial trauma is passed. The data, therefore, fails to support this hypothesis.

Hypothesis 8: Personnel in lower grades with high active federal service are more external and less job satisfied.

Based upon the responses obtained from the thesis survey, this hypothesis proved untestable. When the grade of Staff Sergeant was chosen and the time in service set at 14 years or over, only two respondents qualified under these criteria. When the grade of Technical Sergeant and over 20 years was selected, no respondents were identified. Based upon this lack of personnel who met the requirements, the hypothesis could not be tested. Additionally, total time in service did not provide as good an indication of the concept which was examined in this hypothesis - those remaining in the same grade for a long period of time tend to become more external.

A better measure would have been time in grade, however, this item was not included in the survey.

Hypothesis 9: There is no difference between rated and non-rated officers regarding internal--external control.

The findings in Table XII support this hypothesis. Not only does the split between rated and non-rated officers have no significant effect on internal-external orientation, but each of the other variables also reflects no significant differences.

Hypothesis 4: There is a positive correlation between career intent and internal-external control for personnel with less than 5 years active federal military service.

The cutoff for consideration of less than five years active duty was chosen because little variance occurs in career intent after the five year point (Thompson, 1976). The correlation between career intent and the Rotter measure for this group was .068 ($P = 0.276$). The data, therefore, fails to support this hypothesis.

Summary

The results of the analysis of the survey data presented in this chapter lead to several important conclusions. First, all of the techniques employed in the study of the Rotter measure - factor analysis, correlation analysis, means testing, and regression - support the contention made by several

researchers in the past that the Rotter measure is not unidimensional as originally claimed by Rotter. Additionally, the effect of the different factors on each of the different sub-populations within the sample provides a strong indication of why the measure has been found to be so sensitive to differences in population. Of the factors identified, the political control factor produced the least significant differences for any of the work-related variables and for the analysis of differences between groups.

Concerning the relationship among the variables of job satisfaction, job challenge, autonomy, and the Rotter scale, perhaps the most significant result is the indication that internals are generally more job satisfied than externals. Additionally, it should also be noted that the results of this analysis show that the highest levels of expressed job satisfaction are achieved by internals, who are highly challenged, and who are given a high degree of autonomy. These results are consistent whether the full 22 question measure or the general and personal control factors are used to determine internal-external control orientation. This, therefore, supports the main hypothesis of this thesis that internals in challenging jobs with freedom to act are significantly more job satisfied than those who fall into other categories defined by these variables.

In comparing the results of this analysis with the findings of other researchers, it should be noted that the correlation between job satisfaction and internal-external control ($-.193$,

$P < .001$) is the most significant correlation found. Previously, the most significant correlation was found by Lichtman (1970), the level of significance being .01.

Finally, the results of the testing of internal-external control for different groups indicate that different factors within the Rotter measure produce varying degrees of internal--external orientation for different groups. The multidimensional nature of the Rotter measure should be examined further and must be taken into account when discussing the differences in degrees of internal-external orientation between different groups.

VI: Conclusions and Recommendations

The purpose of this chapter is to summarize and interpret the results of the analysis performed in this thesis and to make recommendations based upon those findings. The factor analysis study performed in Chapter 4 is discussed first. The results of the analysis of the relationships among the variables of job satisfaction, job challenge, autonomy, and the Rotter I-E Scale are discussed next. The findings of the remaining hypothesis testing are then presented. Finally, some recommendations concerning the Rotter scale and the results of the analysis of this study are made.

Factor Analysis, Reliability, and Validity Testing

The initial reason for conducting the factor analysis study was to determine if the question omitted from the Keesler survey invalidated the data obtained. The factor analysis of the AFFDL data with and without the missing question revealed only minor differences in the structure of the factors. For the sample with the question included, this item loaded with three other questions insuring the measurement of the idea or concept of that factor even when the question was omitted. These findings, combined with the extremely high Pearson correlation between the sample with and without the question led to the conclusion that the omission did not invalidate the Keesler data.

The factor analysis study identified six orthogonal factors. Four of the six factors were identified as:

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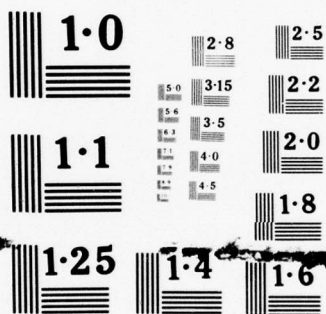
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1) personal control; 2) political control; 3) interpersonal control; and 4) general control. These results contradict the unidimensionality conclusion made by Rotter (1966) and Franklin (1963). Although the results confirm the multi-dimensional findings of Mirels (1970), Cherlin and Bourque (1974), and Gurin, et al. (1969), the number of factors found and identified in this study are not in agreement with the previous studies.

Because six orthogonal factors were identified, the validity of obtaining a summed-score indication of internal versus external control is in doubt. Reliability testing, however, showed the measure to be highly reliable (internally consistent) with a score of 0.77 on both the coefficient alpha and split half tests. Despite the validity question, it was decided to continue the hypothesis testing with the caveat that any indication of high internal or external orientation on the 22 question measure must be tempered by the validity consideration.

Job Satisfaction, Challenge, Autonomy, and the I-E Scale

The main conclusion of the analysis with the work--related variables of job satisfaction, challenge, autonomy, and the Rotter score confirms the findings of Thompson (1975) that challenge and autonomy are the main predictors of job satisfaction in the Air Force. The regression analysis also revealed that career intent and the Rotter scale enter the model of job satisfaction at significant levels, but the added predictive power of these variables is minimal. The

total variance explained by the model is 51%.

In the discussion in Chapter 1, it was stated that one of the main hypotheses of this thesis is that an internal, who perceives a high degree of job challenge and a high degree of autonomy, is also highly job satisfied. In the analysis which held job challenge and autonomy the same while internal-external control was used to split the groups, the combination of high challenge, autonomy, and internal orientation yielded the highest level of job satisfaction found in this thesis. It was also found that internals, in general, expressed significantly higher levels of job satisfaction than externals with similar levels of challenge and autonomy.

Also included in the above analysis was a comparison of the results obtained with the 22 question Rotter scale and factors 1 and 4, personal and general control respectively. For the high challenge and autonomy groups, the general control factor revealed the same significant differences as the 22 question measure. In the other two cases where the Rotter scale produced significant differences, personal control, not general control, produced similar differences. These results are interpreted by this author as further supporting the multidimensional nature of the Rotter I-E Scale and highlight the need for further research into the validity question.

Finally, when the four factors replaced the Rotter scale in the regression analysis, factor 4, general control, entered the regression at approximately the same level of significance

as the Rotter scale had in the previous regression and accounted for approximately the same amount of variance as the 22 question measure. The six-question general control factor, therefore, has the same predictive power concerning job satisfaction as the 22 question measure.

The above findings support the first hypothesis of this thesis that there is a positive relationship among the variables of job satisfaction, job challenge, autonomy, and the Rotter scale. The amount of predictive power added to the job satisfaction model by the Rotter measure, however, is minimal.

Remaining Hypotheses Concerning the Rotter Scale

In order to present the results of the remaining hypothesis testing, each hypothesis is stated first, followed by a brief discussion of the findings.

Hypothesis 2: Officers are more internally oriented than enlisted personnel. The testing not only failed to support this hypothesis, but indicated that enlisted personnel are more internally oriented than officers.

Hypothesis 3: Field grade officers are more internal and job satisfied than company grade officers. The t test showed no difference in satisfaction levels between these groups. The only evidence supporting the locus of control aspect of this hypothesis occurred when the interpersonal control factor was used to determine internal-external

orientation. The other factors and the 22 question measure produced no significant differences. It is concluded, therefore, that the data only weakly supports the hypothesis.

Hypothesis 4: There is a positive correlation between career intent and internal-external control for personnel with less than 5 years active federal military service. The correlation between career intent and Rotter for this group was not significant. The data, therefore, fails to support this hypothesis.

Hypothesis 5: Males are more internally oriented than females. Significant differences were found when the Rotter scale and the interpersonal and general control factors were used to determine locus of control. This hypothesis is accepted.

Hypothesis 6: Minorities (blacks, Spanish Americans, Mexican Americans, etc.) are more external than whites. Although the Rotter measure only weakly supports this hypothesis, the interpersonal and personal control factors reveal highly significant differences. The hypothesis is, therefore, accepted.

Hypothesis 7: Married and single personnel are more internal than divorced, separated, or widowed personnel. The data failed to support this hypothesis. If these experiences do produce an externalizing effect, this effect may not be significant after the initial trauma has passed.

Hypothesis 8: Personnel in lower grades with high active federal military service are more external and less job satisfied. This hypothesis could not be tested due to a lack of respondents falling into this category. A better indicator of this possible relationship may have been time in grade since this hypothesis was based upon the assumption that an individual who fails to be promoted over a long period of time, may develop an external orientation toward the system.

Hypothesis 9: There is no difference between rated and non-rated officers regarding internal-external control. The data supported the acceptance of this hypothesis.

In summary, then, it is interesting to note that the two hypotheses (5 and 6) which are based upon previous work by other authors with similar groups (male-female and white--non-white respectively) were also supported by this thesis. The hypotheses dealing with group differences between the military groups were not supported. These results indicate to this writer that Air Force personnel are similar to non-military groups regarding locus of control.

Recommendations

In discussing the utility of this study in Chapter 1, it was indicated that if a relationship among the variables of job satisfaction, job challenge, autonomy, and the Rotter I-E Scale was determined, a new avenue of study would be

available to the Air Force. The results of the analysis performed with these variables in this thesis support the hypothesized relationship. The analysis also indicates that internals, with high challenge and high autonomy, express the highest level of job satisfaction found in this study. Finally, the results also indicate that internals are significantly more job satisfied than externals.

Before this author can recommend that further analysis with these variables should be made to determine if the assignment of personnel could be partially based upon this relationship, a detailed analysis of the validity of the Rotter measure must be recommended. The factor analysis studies of Mirels (1970), Cherlin and Bourque (1974), Gurin, et al. (1969), and now this writer, indicate that the Rotter I-E Scale is multidimensional and the validity of summing the questions to obtain an indication of internal or external orientation must be questioned. The analysis conducted with the separate factors in this study indicates that the hypothesized relationship is supported. However, this author feels that a detailed dimensionality study is required before any final conclusions can be made. Because of the popularity of the Rotter measure in behavioral and organizational research in recent years, and the potential benefit indicated by the support of the hypothesized relationship, this dimensionality study becomes even more important.

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APPENDIX A
Thesis Survey

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 3300 TECHNICAL TRAINING WING (ATC)
KEESLER AIR FORCE BASE, MISSISSIPPI 39534



REPLY TO
ATTN OF:

CC

15 Apr 77

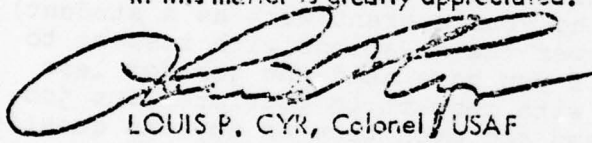
SUBJECT:

Questionnaire

TO:

Individual Selected

You have been selected to participate in research regarding several aspects of Air Force life. This survey should only take about 15 minutes of your time, and I ask that you give your full cooperation in answering the various questions. Please understand that you are not required to participate in this survey and that no adverse action will be taken against any individual who prefers not to complete the questions. Because of the importance of research of this type, however, I urge all of you to participate and to answer each question honestly, with your own opinion. Your cooperation in this matter is greatly appreciated.



LOUIS P. CYR, Colonel USAF
Commander

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (AU)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433



REPLY TO
ATTN OF: AFIT/ENS (Capt Cardinal, 52549)

15 Apr 77

SUBJECT: Masters Thesis Survey

TO: Individual Selected

1. The questions in the survey which follows will form the data base for my Masters Thesis at the Air Force Institute of Technology. The survey is divided into three parts: 1) biographical data, 2) questions concerning your perceptions about various aspects of your work life and your career, and 3) a series of questions to determine how different events in our society affect you. The survey consists of 42 rather brief questions and should require only about 10 minutes of your time.

2. In answering the work life questions in Part II, please observe the following rule: If you have been in your current job (not including your current work as a student) for over six months, answer the questions with respect to your current position; if you have held the job for less than six months, answer with respect to your previous job. Additionally, do not spend too much time on any one question.

3. In order for the data to be valid, please answer each question as you feel it should be answered, not as others might want you to answer. These surveys will be held in the strictest confidence, the results to be presented in summary form, not as individual cases. Thank you for your time and effort on my behalf.

FOR THE COMMANDER

Lawrence D. Cardinal
LAWRENCE D. CARDINAL, Capt, USAF
Candidate for Masters Degree
Department of Systems Management
Air Force Institute of Technology

Strength Through Knowledge

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority

- (1) 5 U.S.C. 301, Departmental Regulations; and/or
- (2) 10 U.S.C. 8012, Secretary of the Air Force, Powers and Duties, Delegation by.

b. Principal Purposes. This survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine Uses. The survey data will be converted to information to be used in research of management related problems. Results of the research based upon the data provided will be included in published articles, reports or texts. Distribution of the results of the research, based upon the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

THESIS SURVEY

PART I.

In the biographical data questions which follow, please circle the letter preceding the correct answer in each question.

1. What is your present active duty grade?

- | | |
|--------------------------|---------------------------|
| A. Colonel | I. Senior Master Sergeant |
| B. Lieutenant Colonel | J. Master Sergeant |
| C. Major | K. Technical Sergeant |
| D. Captain | L. Staff Sergeant |
| E. First Lieutenant | M. Senior Airman |
| F. Second Lieutenant | N. Airman First Class |
| G. Warrant Officer | O. Airman |
| H. Chief Master Sergeant | P. Airman Basic |
| | Q. Sergeant |

2. How much active federal military service have you completed?

- | | |
|------------------------------|------------------------------|
| A. Less than 1 year | L. 11 years but less than 12 |
| B. 1 year but less than 2 | M. 12 years but less than 13 |
| C. 2 years but less than 3 | N. 13 years but less than 14 |
| D. 3 years but less than 4 | O. 14 years but less than 15 |
| E. 4 years but less than 5 | P. 15 years but less than 16 |
| F. 5 years but less than 6 | Q. 16 years but less than 17 |
| G. 6 years but less than 7 | R. 17 years but less than 18 |
| H. 7 years but less than 8 | S. 18 years but less than 19 |
| I. 8 years but less than 9 | T. 19 years but less than 20 |
| J. 9 years but less than 10 | U. 20 years or more |
| K. 10 years but less than 11 | |

3. What is your sex?

- A. Male
- B. Female

4. What is your marital status?

- | | |
|-------------------------------|----------------------|
| A. Married | D. Legally separated |
| B. Never been married | E. Widower/widow |
| C. Divorced and not remarried | |

5. Which of the following do you consider yourself?

- | | |
|--------------------------------|----------------------|
| A. Black | D. Oriental American |
| B. Spanish or Mexican American | E. White |
| C. American Indian | F. Other |

6. What is your aeronautical rating?

- A. Not applicable, I am enlisted
- B. Non-rated
- C. Pilot
- D. Navigator

PART II.

In the questions related to your worklife, please answer by indicating how you feel about your job and your career. If you have been in your current job (not including your current work as a student) for over six months, answer the questions with respect to your current position; if you have held the job for less than six months, answer with respect to your previous job. Please do not spend too much time on any question, and, again, circle the letter preceding the appropriate choice.

7. Which of the following best describes your attitude toward making the Air Force a career?

- A. Definitely intend to make the Air Force a career
- B. Most likely will make the Air Force a career
- C. Undecided
- D. Most likely will not make the Air Force a career
- E. Definitely do not intend to make the Air Force a career

8. Which one of the following shows how much of the time you feel satisfied with your job?

- A. All of the time
- B. Most of the time
- C. A good deal of the time
- D. About half of the time
- E. Occasionally
- F. Seldom
- G. Never

9. Choose one of the following which tells how well you like your job.
- A. I hate it
 - B. I dislike it
 - C. I don't like it
 - D. I am indifferent to it
 - E. I like it
 - F. I am enthusiastic about it
 - G. I love it
10. Which one of the following best tells how you feel about changing your job?
- A. I would quit at once if I could
 - B. I would take almost any other job in which I could earn as much as I am earning now
 - C. I would like to change both my job and my occupation
 - D. I would like to change my present job for another one
 - E. I am not eager to change my job, but I would do so if I could get a better job
 - F. I cannot think of any jobs for which I would exchange
 - G. I would not exchange my job for any other
11. Which one of the following shows how you think you compare with other people?
- A. No one likes his job better than I like mine
 - B. I like my job much better than most people like theirs
 - C. I like my job better than most people like theirs
 - D. I like my job about as well as most people like theirs
 - E. I dislike my job more than most people dislike theirs
 - F. I dislike my job much more than most people dislike theirs
 - G. No one dislikes his job more than I dislike mine
12. How do you evaluate the challenge of your job?
- A. Boring
 - B. Not challenging
 - C. Somewhat challenging
 - D. Challenging
 - E. Very challenging

To answer the next question, please circle the number on the scale which is most accurate.

13. How much autonomy is there in your job? That is, to what extent does the job permit you to decide on your own how to go about doing the work?

1-----2-----3-----4-----5-----6-----7

Very little; the job gives me almost no personal "say" about how and when the work is done

Moderate autonomy; many things are standardized and not under my control, but I can make some decisions about the work

Very much; the job gives me almost complete responsibility for deciding how and when the work is done

PART III.

The questions in this final part of the survey are intended to find out the way in which certain important events in our society affect different people. Each item consists of a pair of statements lettered a or b. Please select the one statement of each pair (and only one) which you strongly believe to be the case as far as you are concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal beliefs, so obviously, there are no right or wrong answers. In some instances, you may find that you believe both statements or neither one. In such cases be sure to select the one you more strongly believe to be the case as far as you are concerned. Respond to each question independently of how you answered any other question. Again, answer by circling the letter corresponding to the answer you more strongly believe to be the case as far as you are concerned.

14. a. Children get into trouble because their parents punish them too much.
- b. The trouble with most children nowadays is that their parents are too easy with them.
15. a. Many of the unhappy things in peoples' lives are partly due to bad luck.
- b. Peoples' misfortunes result from the mistakes they make.
16. a. One of the major reasons we have wars is because people don't take enough interest in politics.
- b. There will always be wars no matter how hard people try to prevent them.

- 17. a. In the long run people get the respect they deserve in this world.
- b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
- 18. a. The idea that teachers are unfair to students is nonsense.
- b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
- 19. a. Without the right breaks one cannot be an effective leader.
- b. Capable people who fail to become leaders have not taken advantage of their opportunities.
- 20. a. No matter how hard you try, some people just don't like you.
- b. People who can't get others to like them don't understand how to get along with others.
- 21. a. Heredity plays the major role in determining one's personality.
- b. It is one's experiences in life which determine what they are like.
- 23. a. In the case of the well-prepared student, there is rarely if ever such a thing as an unfair test.
- b. Many times exam questions tend to be so unrelated to course work that studying is really useless.
- 24. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
- b. Getting a good job depends on being in the right place at the right time.
- 25. a. The average citizen can have an influence in government decisions.
- b. The world is run by the few people in power and there is not much the little guy can do about it.

- 26. a. When I make plans I am almost certain I can make them work.
b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
- 27. a. There are certain people who are just no good.
b. there is some good in everybody.
- 28. a. In my case getting what I want has little or nothing to do with luck.
b. Many times we might as well decide what to do by flipping a coin.
- 29. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
- 30. a. One should always be willing to admit one's mistakes.
b. It is usually better to cover up one's mistakes.
- 31. a. As far as world events are concerned, most of us are the victims of forces we can neither understand nor control.
b. By taking an active part in political and social affairs, the people can control world events.
- 32. a. Most people do not realize the extent to which their lives are controlled by accidental happenings.
b. There is really no such thing as "luck".
- 33. a. It is hard to know whether or not a person really likes you.
b. How many friends you have depends upon how nice a person you are.

- 34. a. In the long run the bad things that happen to us are balanced by the good ones.
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
- 35. a. With enough effort we can wipe out political corruption.
b. It is difficult for people to have much control over the things politicians do in office.
- 36. a. Sometimes I can't understand how teachers arrive at the grades they give.
b. There is a direct connection between how hard I study and the grades I get.
- 37. a. A good leader makes it clear to everybody what their jobs are.
b. A good leader expects people to decide for themselves what they should do.
- 38. a. Many times I feel that I have little influence over the things that happen to me.
b. It is impossible for me to believe that chance or luck plays an important role in my life.
- 39. a. People are lonely because they don't try to be friendly.
b. There is not much use in trying too hard to please people; if they like you, they like you.
- 40. a. There is too much emphasis on athletics in high school.
b. Team sports is an excellent way to build character.
- 41. a. What happens to me is my own doing.
b. Sometimes I feel I don't have enough control over the direction my life is taking.

- 42. a. Most of the time I can't understand why politicians behave the way they do.
- b. In the long run the people are responsible for bad government on a national as well as a local level.
- 43. [This question was omitted from the Keesler survey]
- a. I have often found that what is going to happen will happen.
- b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

APPENDIX B

Breakdown of Sample Population by Grade

Breakdown of Total Sample Population by Grade

<u>Grade</u>	<u>N</u>	<u>HOP</u> <u>MEAN</u>	<u>HOP</u> <u>SD</u>	<u>CHAL</u> <u>MEAN</u>	<u>CHAL</u> <u>SD</u>	<u>AUTO</u> <u>MEAN</u>	<u>AUTO</u> <u>SD</u>	<u>ROT</u> <u>MEAN</u>	<u>ROT</u> <u>SD</u>
Total Sample Population	338	19.5	3.8	3.6	1.0	4.5	1.6	8.3	4.1
Lieutenant Colonel	4	21.5	2.4	4.0	1.4	4.5	1.7	6.5	3.4
Major	15	18.9	4.6	3.5	1.1	4.8	1.7	8.8	4.0
Captain	103	19.7	3.8	3.7	1.1	4.7	1.8	8.8	4.3
First Lieutenant	22	20.1	2.9	3.7	1.0	4.9	1.1	8.5	4.5
Second Lieutenant	5	19.2	4.8	4.4	0.9	5.0	2.3	12.2	5.9
Chief Master Sergeant	1	25.0	0.0	4.0	0.0	7.0	0.0	6.0	0.0
Senior Master Sergeant	5	23.8	2.2	4.6	0.5	4.8	2.2	6.2	3.8
Master Sergeant	21	20.1	3.7	3.3	0.8	5.1	1.5	8.0	3.9
Technical Sergeant	38	20.0	3.4	3.7	0.9	4.5	1.5	7.4	3.9
Staff Sergeant	80	19.4	3.8	3.5	1.0	4.2	1.6	8.1	4.3
Sergeant	20	17.2	3.6	2.9	1.0	4.1	1.6	7.8	3.2
Senior Airman	13	16.8	4.0	3.0	1.4	4.1	1.8	9.5	.30
Airman First Class	10	19.7	5.1	3.5	1.3	3.8	1.6	7.4	3.8
Airman	1	19.0	0.0	5.0	0.0	4.0	0.0	9.0	0.0

NOTE: See Table I for Abbreviations

Breakdown of Keesler Data by Grade

<u>Grade</u>	<u>N</u>	<u>HOP</u> <u>MEAN</u>	<u>HOP</u> <u>SD</u>	<u>CHAL</u> <u>MEAN</u>	<u>CHAL</u> <u>SD</u>	<u>AUTO</u> <u>MEAN</u>	<u>AUTO</u> <u>SD</u>	<u>ROT</u> <u>MEAN</u>	<u>ROT</u> <u>SD</u>
Total Group	224	19.4	3.7	3.5	1.0	4.4	1.6	8.1	4.1
Lieutenant Colonel	2	22.0	2.8	3.5	2.1	3.5	2.1	6.0	1.4
Major	7	18.6	4.4	3.4	1.0	4.3	1.7	9.7	5.3
Captain	21	19.3	4.1	3.3	1.1	4.8	1.9	8.2	4.9
First Lieutenant	3	21.0	1.0	4.0	1.0	4.0	1.0	9.3	2.5
Second Lieutenant	2	21.0	1.4	5.0	0.0	6.0	0.0	13.5	4.9
Chief Master Sergeant	1	25.0	0.0	4.0	0.0	7.0	0.0	6.0	0.0
Senior Master Sergeant	5	23.8	2.2	4.6	0.5	4.8	2.2	6.2	3.8
Master Sergeant	21	20.1	3.7	3.3	0.8	5.1	1.5	8.0	3.9
Technical Sergeant	38	20.0	3.4	3.7	0.9	4.5	1.5	7.4	3.9
Staff Sergeant	80	19.4	3.8	3.5	1.0	4.2	1.6	8.1	4.3
Sergeant	20	17.2	3.6	2.9	1.0	4.1	1.6	7.8	3.2
Senior Airman	13	16.8	4.0	3.0	1.4	4.1	1.8	9.5	3.0
Airman First Class	10	19.7	5.1	3.5	1.3	3.8	1.6	7.4	3.8
Airman	1	19.0	0.0	5.0	0.0	4.0	0.0	9.0	0.0

NOTE: See Table I for Abbreviations

Breakdown of AFIT Students Enrolled for over 3 Months by Grade

<u>Grade</u>	<u>N</u>	<u>HOP</u> <u>MEAN</u>	<u>HOP</u> <u>SD</u>	<u>CHAL</u> <u>MEAN</u>	<u>CHAL</u> <u>SD</u>	<u>AUTO</u> <u>MEAN</u>	<u>AUTO</u> <u>SD</u>	<u>ROT</u> <u>MEAN</u>	<u>ROT</u> <u>SD</u>
Total Group	70	19.7	3.7	3.7	1.0	4.9	1.7	9.3	4.2
Lieutenant Colonel	2	21.0	2.8	4.5	0.7	5.5	0.7	7.0	5.7
Major	8	19.3	5.0	3.5	1.2	5.3	1.6	8.0	2.4
Captain	50	19.6	3.6	3.7	1.0	4.8	1.7	9.3	4.1
First Lieutenant	7	21.1	1.6	4.1	0.4	5.1	0.9	10.7	5.1
Second Lieutenant	3	18.3	6.2	4.0	1.0	4.3	3.1	11.3	7.4

NOTE: See Table I for Abbreviations

11

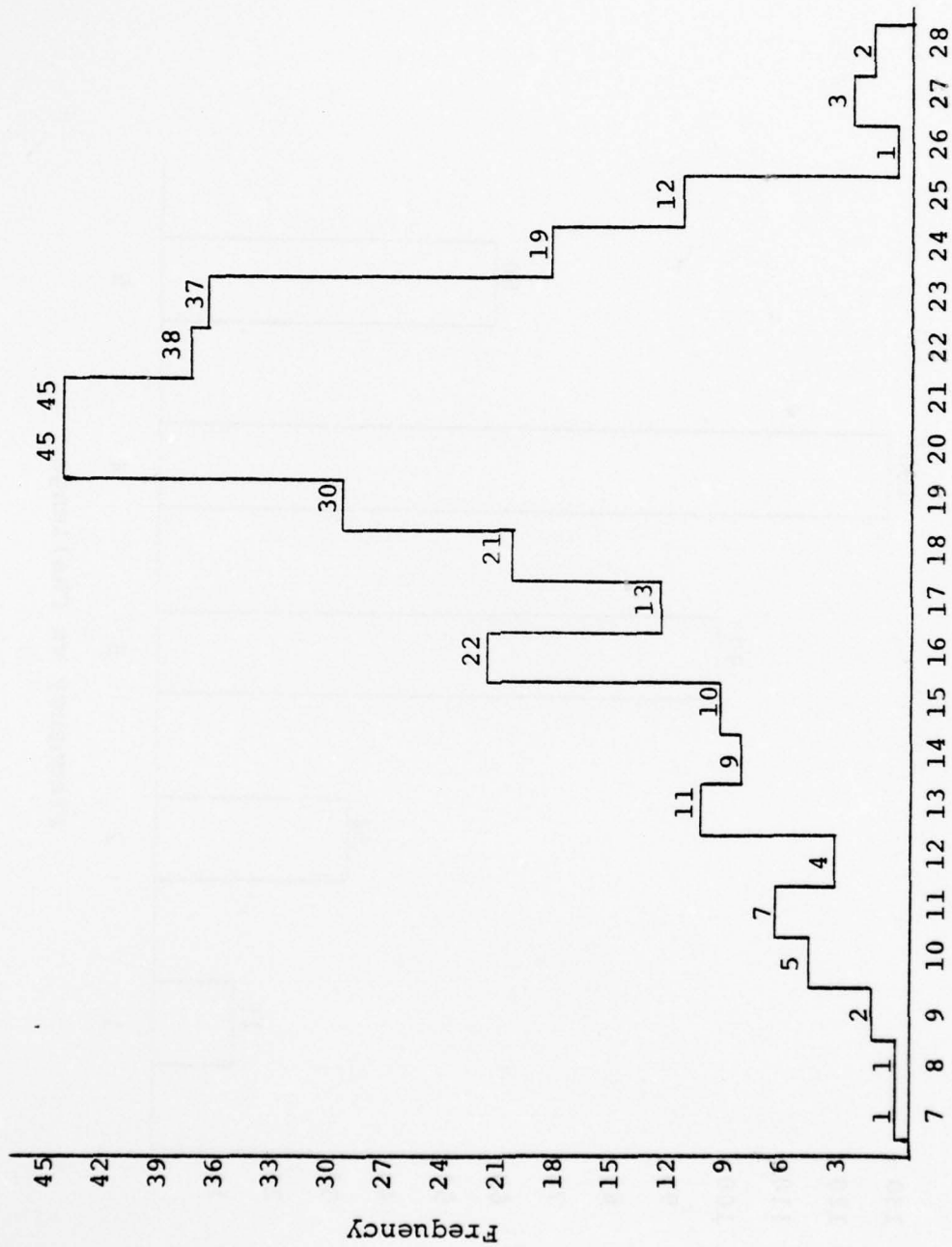
Breakdown of New AFIT GSM and GOR Students by Grade

<u>Grade</u>	<u>N</u>	<u>HOP</u> <u>MEAN</u>	<u>HOP</u> <u>SD</u>	<u>CHAL</u> <u>MEAN</u>	<u>CHAL</u> <u>SD</u>	<u>AUTO</u> <u>MEAN</u>	<u>AUTO</u> <u>SD</u>	<u>ROT</u> <u>MEAN</u>	<u>ROT</u> <u>SD</u>
Total Group	44	19.9	3.9	3.7	1.1	4.7	1.6	8.0	4.2
Captain	32	20.1	4.0	3.8	1.1	4.5	1.7	8.4	4.2
First Lieutenant	12	19.3	3.6	3.3	1.2	5.0	1.2	7.1	4.2

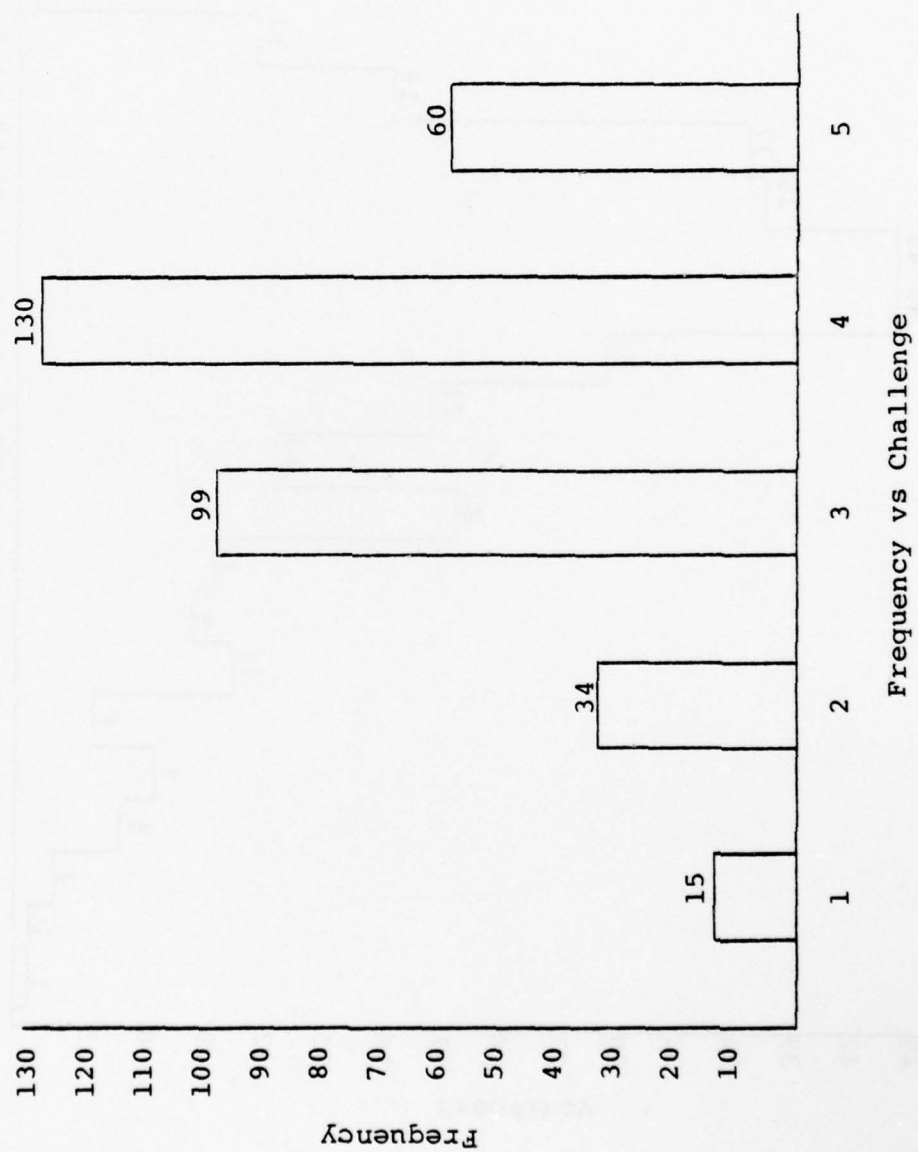
NOTE: See Table I for Abbreviations

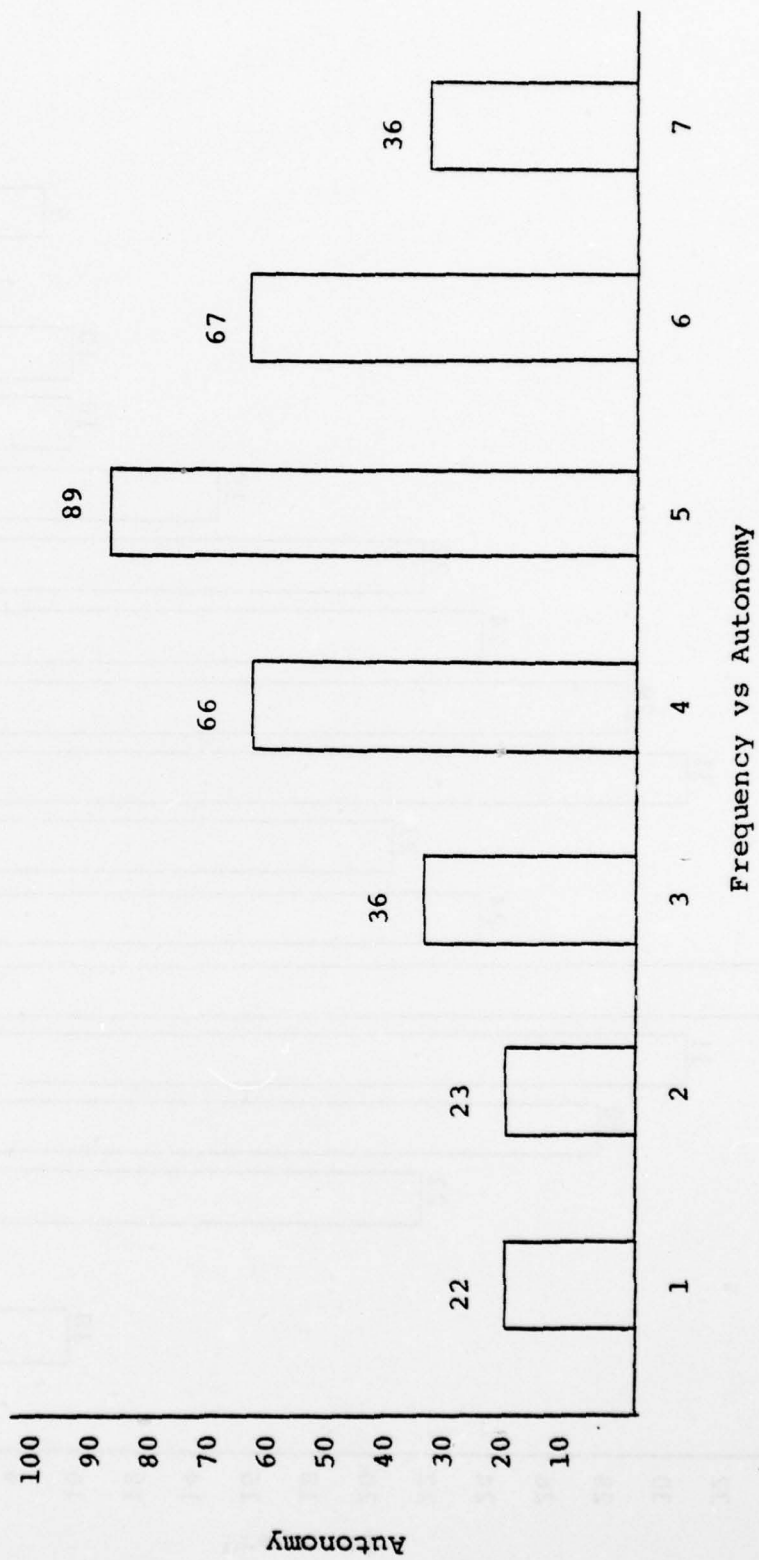
APPENDIX C

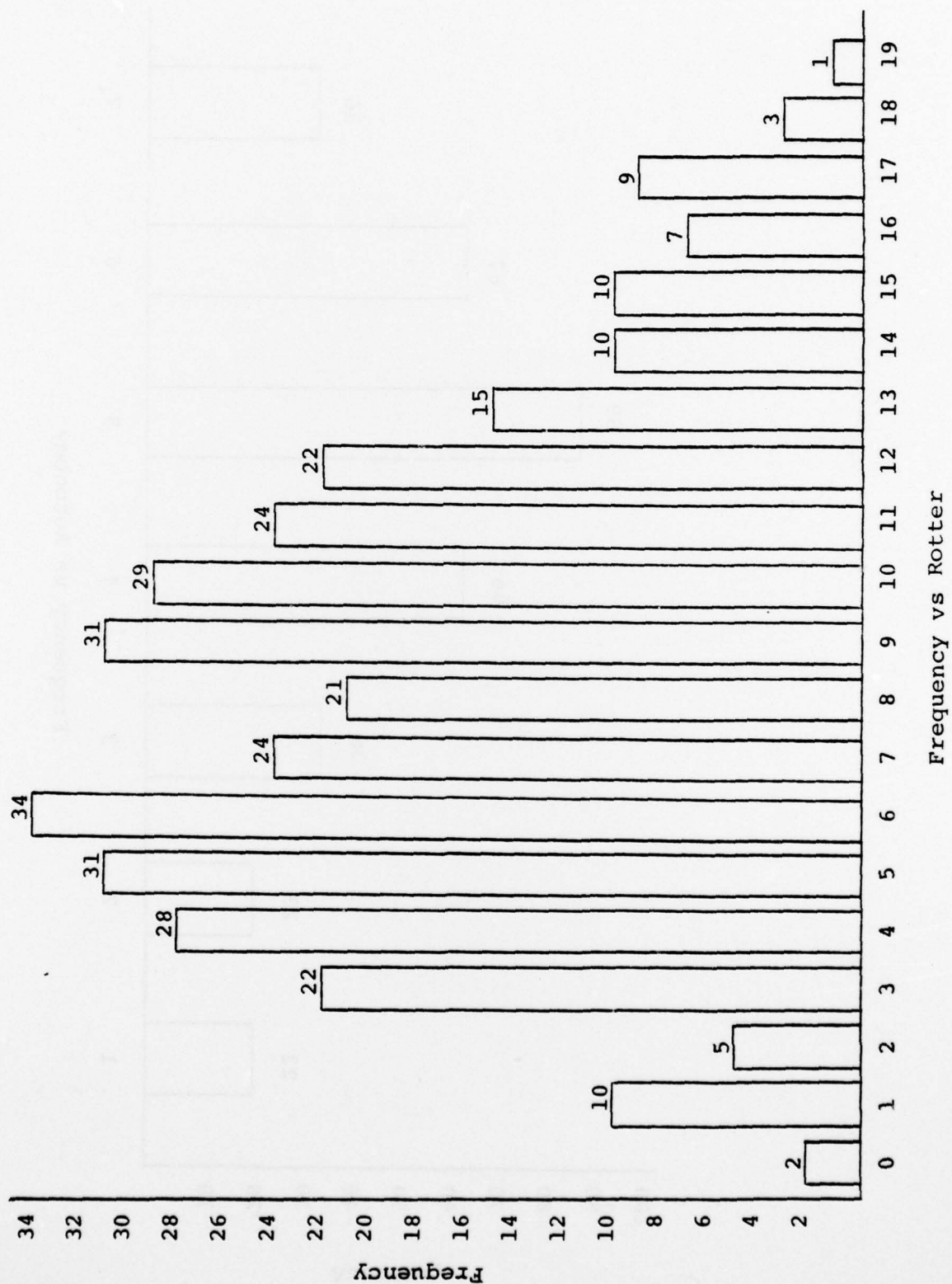
Histograms for Job Satisfaction,
Challenge, Autonomy, and Rotter



Frequency vs Hoppock







APPENDIX D

Cherlin and Bourque Factor Analysis

Cherlin and Bourque Factor Analysis

College Student Sample

<u>Item (external choice)</u>	<u>Factor 1</u>
2. Many of the unhappy things in peoples' are partly due to bad luck.	.41
4. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.	.48
6. Without the right breaks one cannot be an effective leader.	.54
10. Many times exam questions tend to be so unrelated to course work that studying is really useless	.46
11. Getting a good job depends mainly on being in the right place at the right time.	.61
15. Many times we might just as well decide what to do by flipping a coin.	.52
16. Who gets to be the boss depends on who was lucky enough to be in the right place first.	.53
19. Most people don't realize the extent to which their lives are controlled by accidental happenings.	.53
20. It is hard to know whether or not a person really likes you.	.43
23. Sometimes I can't understand how teachers arrive at the grades they give.	.42
25. Many times I feel that I have little influence over the things that happen to me.	.65
28. Sometimes I feel I don't have enough control over the direction my life is taking.	.54
13. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.	.38

Cherlin and Bourque Factor Analysis

College Student Sample

<u>Item (external choice)</u>	<u>Factor 2</u>
3. There will always be wars no matter how hard people try to prevent them.	.65
7. No matter how hard you try, some people just don't like you.	-.42
9. I have often found that what is going to happen will happen.	.50
12. The world is run by the few people in power and there is not much the little guy can do about it.	.62
18. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.	.70
22. It is difficult for people to have much control over the things politicians do in office.	.66
29. Most of the time I can't understand why politicians behave the way they do.	.54

Cherlin and Bourque Factor Analysis

Resident Sample

<u>Item (external choice)</u>	<u>Factor 1</u>
3. There will always be wars no matter how hard people try to prevent them.	.43
9. I have often found that what is going to happen will happen.	.50
12. The world is run by the few people in power and there is not much the little guy can do about it.	.78
13. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.	.56
18. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.	.56
22. It is difficult for people to have much control over the things politicians do in office.	.76
29. Most of the time I can't understand why politicians behave the way they do.	.73

Cherlin and Bourque Factor Analysis

Resident Sample

<u>Item (external choice)</u>	<u>Factor 2</u>
6. Without the right breaks one cannot be an effective leader.	.56
10. Many times exam questions tend to be so unrelated to course work that studying is really useless.	.43
11. Getting a good job depends mainly on being in the right place at the right time.	.62
19. Most people don't realize the extent to which their lives are controlled by accidental happenings.	.48
21. In the long run the bad things that happen to us are balanced by the good ones.	.46
25. Many times I feel I have little influence over the things that happen to me.	.63

APPENDIX E

Correspondence with Rotter

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (AU)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433



REPLY TO

ATTN OF: AFIT/ENS (Capt Corbin/Capt Cardinal, 255-2549)

17 Feb 1977

SUBJECT: Masters Theses

TO: Professor Julian B. Rotter
Department of Psychology
University of Connecticut

1. At the present time, we are enrolled in the Air Force Institute of Technology pursuing a Masters Degree in Systems Management. In partial fulfillment of the requirements for this degree, each student must perform independent study, a thesis, within the management field.

2. Under the guidance of Capt Michael J. Stahl, Ph.D., Systems Management Department, both Capt Corbin and Capt Cardinal have chosen topics employing the Rotter Internal/External Control theory. Capt Corbin is attempting to determine the relationship between Internal/External, Job Satisfaction, Productivity, and Leadership Behavior. Capt Cardinal is exploring the relationship between Internal/External, Job Challenge, and Job Satisfaction.

3. Thus far, we have obtained a copy of your chapter on "Generalized Expectancies for Internal Versus External Control of Reinforcement" from the Rotter, Chance, and Phares book, Application of a Social Learning Theory of Personality. We have also obtained general articles concerning other applications of the Internal/External Control Theory. Among these are: "Interpersonal Trust, Internal-External Control and The Warren Commission Report" by Geller, Hamsher, and Rotter; "Internal Versus External Control of Reinforcement: a Review" by Lefcourt; and "Review of the Internal-External Control Construct as a Personality Variable" by Joe.

4. We are interested in obtaining and/or being informed of any studies which you are aware of which have been conducted in our topical areas. Most importantly, we welcome your suggestions and comments concerning these research efforts. We will keep you informed as to our progress and findings. We appreciate your time and effort on our behalf.

5. Please forward any information to:

AFIT/ENA
ATTN: Capt Larry J. Corbin
WPAFB, OH 45433

Larry J. Corbin

LARRY J. CORBIN, Capt, USAF
Graduate Student
Systems Management Department

Lawrence D. Cardinal

LAWRENCE D. CARDINAL, Capt, USAF
Graduate Student
Systems Management Department

The
University
of
Connecticut

STORRS, CONNECTICUT 06268

THE COLLEGE OF
LIBERAL ARTS AND SCIENCES
Department of Psychology

February 23, 1977

AFIT/ENA

Attn: Capt. Larry J. Corbin
WPAFB, OH 45433

Dear Captain Corbin:

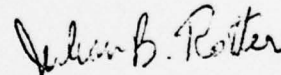
The only possible hope that I can give you is
to suggest that you look at the bibliographies contained
in two recent books. They are:

Phares, E. J. Locus of Control in
Personality (General Learning Press:
Morristown, N.J., 1976)

Iefcourt, H. M. Locus of Control: Current
Trends in Theory & Research (Lawrence
Erlbaum Associates: Hillsdale, N.J., 1976)

I am enclosing a reprint on Trust in occupations which may
be of interest.

Very truly yours,



Julian B. Rotter
Professor of Psychology

JBR/isw
Encl.

Vita

Lawrence D. Cardinal was born in Cambridge, Mass. on 13 July 1949. At the age of six he moved to Elizabethtown, Pa. He was graduated from Lancaster Catholic High School in 1967 and from Elizabethtown College in 1971 with a BS in Physics. He attended Officer Training School and was commissioned on 2 Nov 1971.

His first assignment in the Air Force was as a MAJCOM Computer Programming Officer, HqTAC, Langley AFB, Va. There he worked with personnel systems and assisted in the conversion from the H1800 to the H6050 and World Wide Military Command and Control System (WWMCCS). He also assisted in the implementation of the Advanced Personnel Data System (APDS).

In 1974 he moved to China Lake Naval Weapons Center, Ca. where he served as TAC Liaison Programming Officer and aided in the development of the first Air Force developed Operational Flight Program for the A7D attack aircraft. Captain Cardinal then entered the Air Force Institute of Technology in June, 1976.

Permanent Address: 1 Creston Ave
Woburn, Mass. 01801

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Job Satisfaction Rotter Internal-External Control Measure		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The primary purpose of this thesis was to examine the relationships among the variables of job satisfaction, job challenge, autonomy, and the Rotter Internal-External Control measure. A secondary purpose was to determine if differences in internal-external orientation exist between different subgroups within the Air Force. A survey was conducted and data from 338 Air Force personnel		

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was obtained. The data was factor analyzed and six orthogonal factors were identified. Four were labeled as: 1) personal control; 2) political control; 3) interpersonal control; and 4) general control.

The analysis supported the hypothesis that there is a positive relationship among the variables mentioned above. It was also found that internals are generally more job satisfied than externals. Males were found to be more internal than females, whites more internal than nonwhites, and enlisted men more internal than officers.

Because of the multidimensionality of the Rotter measure, however, further validity and dimensionality studies of the Rotter scale are required before any recommendations can be made based upon the results of the analysis.

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